

Contract No. F41624-01-D8546
Delivery Order No. 0010

**CLOSURE REPORT
FOR AREA OF CONCERN (AOC) 40,
FORMER GOLF COURSE MAINTENANCE AREA
FORMER NORTON AIR FORCE BASE, CALIFORNIA**

**FORMER NORTON AIR FORCE BASE
SAN BERNARDINO, CALIFORNIA**

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TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION	1-1
1.1 SITE LOCATION AND DESCRIPTION	1-1
1.2 SITE BACKGROUND	1-1
1.3 REMEDIAL OBJECTIVES	1-4
2.0 REMEDIAL ACTION IMPLEMENTATION	2-1
2.1 AREAS OF CONTAMINATION	2-1
2.2 DEMOLITION OF MAINTENANCE SHEDS	2-3
2.3 REMOVAL OF SOIL	2-3
2.3.1 Phase I Removal and Confirmation Sampling	2-3
2.3.1.1 Analytical Results	2-5
2.3.2 Phase II Removal and Confirmation Sampling	2-8
2.3.2.1 Analytical Results	2-13
2.4 QUALITY CONTROL/QUALITY ASSURANCE	2-15
2.5 WASTE MANAGEMENT	2-17
2.6 SITE RESTORATION	2-18
3.0 REMEDIAL ACTION PERFORMANCE	3-1
3.1 SOIL REMOVAL SUMMARY	3-1
3.1.1 Confirmation Sampling Evaluation	3-1
3.2 POST-REMEDIAL ACTION RISK ANALYSIS	3-2
3.2.1 Human Health Risk Assessment	3-2
3.3 REMEDIAL ACTION EFFECTIVENESS	3-3
4.0 REFERENCES	4-1

Appendices

Appendix A: Photographs

Appendix B: Laboratory Reports

Appendix C: Human Health Risk Tables

LIST OF TABLES

2-1	Contaminants of Concern and Target Clean-up Goals	2-3
2-2	Analytical Results from Confirmation Soil Samples: 1st Removal	2-12
2-3	Analytical Results from Confirmation Soil Samples: 2nd Removal	2-15

LIST OF FIGURES

1	AOC 40 Former Norton AFB, California	1-2
2	Locations with Soil Contamination, AOC 40	1-3
3	Proposed Soil Removal Areas, AOC 40	2-2
4	AOC 40 Approximate Extent of Initial Soil Removal and Confirmation Sample Locations	2-4
5	AOC 40 Approximate Extent of All Soil Removal and Confirmation Sample Locations	2-6
6	AOC 40 Soil Removal (1st) Confirmation Sampling Locations Area 1	2-7
7	AOC 40 Soil Removal (1st) Confirmation Sampling Locations Area 2	2-9
8	AOC 40 Soil Removal Confirmation Sampling Locations Area 3	2-10
9	AOC 40 Soil Removal Confirmation Sampling Locations Area 4	2-11
10	AOC 40 Soil Removal Final Confirmation Sampling Locations Area 1	2-14
11	AOC 40 Soil Removal Final Confirmation Sampling Locations Area 2	2-16

LIST OF ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFCEE	Air Force Center For Environmental Excellence
AOC	area of concern
bgs	below ground surface
CDM	Camp, Dresser, and McKee
CoC	chain-of-custody
COC	contaminant of concern
CS	confirmation study
DO	delivery order
DQO	data quality objective
EPA	Environmental Protection Agency
EPC	exposure point concentration
ESI	expanded source investigation
FS	feasibility study
GPS	global positioning system
HASP	health and safety plan
IC	institutional control
ID	identification
IRP	Installation Restoration Program
IWTP	Industrial Waste Treatment Plant
mg/kg	milligram per kilogram
PCB	polychlorinated biphenyl
PRG	preliminary remediation goal
QA	quality assurance
QC	quality control
SAP	sampling and analysis plan
SVOC	semivolatile organic compound
TPH	total petroleum hydrocarbons
UCL	upper confidence limit
VOC	volatile organic compound
WP	work plan

1.0 INTRODUCTION

This document presents the closure report for area of concern (AOC) 40, known as the Golf Course maintenance area at the former Norton Air Force Base (AFB), San Bernardino, California. AOC 40 was previously identified under the Installation Restoration Program (IRP). This report documents the activities performed for removal of numerous sheds, foundations, and contaminated soil. The report also presents analytical results from soil samples collected at AOC 40 after soil removal, and offers conclusions with respect to the current environmental condition of the AOC. This document is being prepared by Earth Tech under the direction of the Air Force Center for Environmental Excellence (AFCEE), and under Delivery Order (DO) 0010 as part of the Contract F41624-01-D8546.

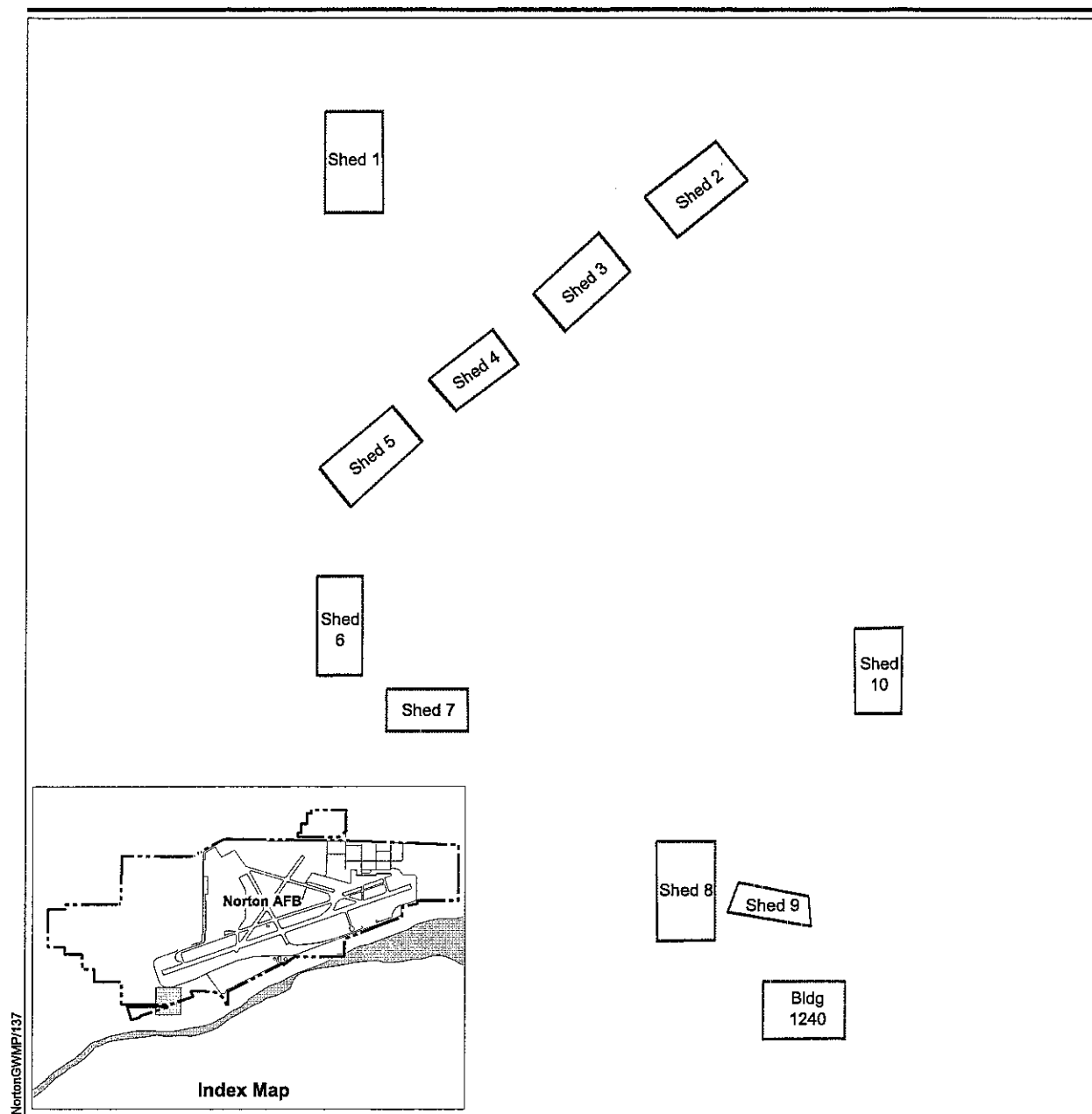
1.1 SITE LOCATION AND DESCRIPTION

AOC 40 is known as the former golf course maintenance area and is situated at the southern end of the former Industrial Waste Treatment Plant (IWTP) compound along the southern perimeter of the base (Figure 1). The former maintenance area was used by the golf course maintenance group to store and mix a variety of pesticides, herbicides, and fungicides. Reportedly, spills of fungicides and arsenic-based chemicals occurred at several of the sheds. Excess quantities of several chemicals were stored over long periods of time and may have leaked as the storage vessels began to deteriorate. In addition, waste oil may have been stored near one of the sheds (Camp, Dresser, and McKee [CDM] Federal 1995a, 1996).

1.2 SITE BACKGROUND

AOC 40 was investigated during two separate studies (CDM Federal 1995a, 1996). Soil sampling results indicated the presence of polychlorinated biphenyls (PCBs), fuels, pesticides, and metals (Figure 2). PCBs were detected at various locations within the site area with a maximum concentration of 3.5 milligrams/kilogram (mg/kg), a value above the residential soil preliminary remediation goal (PRG) of 0.22 mg/kg. Only two other samples had PCB concentrations of 0.23 and 0.25 mg/kg, thus exceeding the PRG. One sample, which contained chlordane at a concentration of 4.0 mg/kg, exceeded the residential soil PRG value of 1.6 mg/kg. For metals, arsenic and cadmium were found at maximum concentrations of 26 mg/kg and 15.6 mg/kg, respectively, which are both greater than the residential PRGs and Norton-specific background levels. No volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), or total petroleum hydrocarbons (TPH) with concentrations exceeding clean-up criteria were found during the investigations.

The Air Force decided to remove the old buildings and other structures at the site as part of the ongoing basewide cleanup effort. Along with building demolition at AOC 40, it was also decided to remove contaminated soil in and around "hot spots," as defined in the feasibility study (FS) (CDM Federal, 2003). A work plan (WP), including a sampling and analysis plan (SAP) and health and safety plan (HASP), was prepared to describe the activities to be performed as well as the analytical data required to determine the final site conditions (Earth Tech 2003). The work plan and SAP were approved by the regulatory community, and subsequently the demolition activities and soil removal began in mid-December 2003. Final confirmation sampling occurred in early March 2004.



**AOC 40
Former Norton AFB,
California**

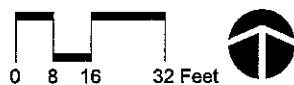
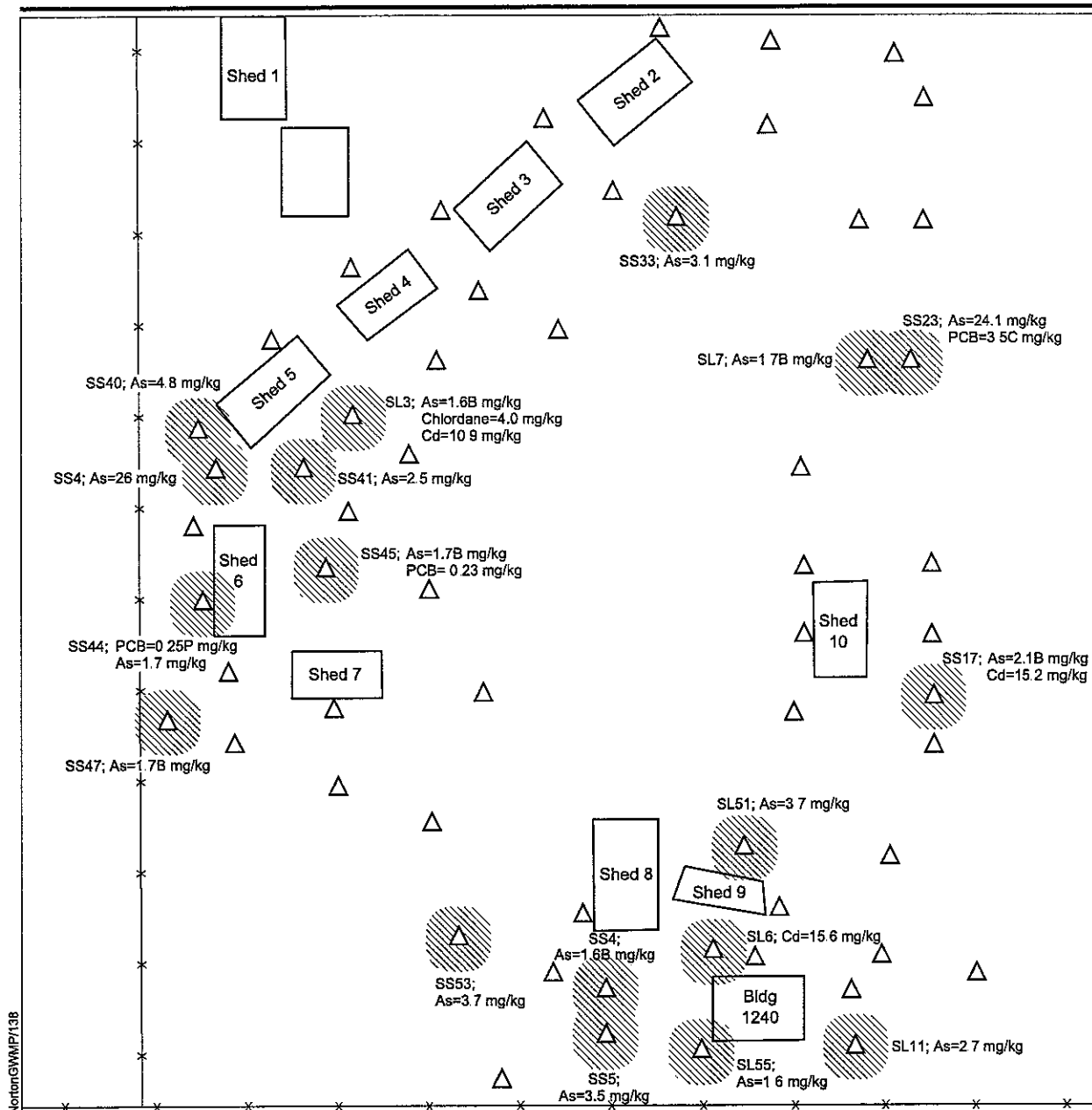


Figure 1



EXPLANATION

- △ Soil Sample Location
- ▨ Potential Area of Soil Contamination
- As Arsenic
- Cd Cadmium
- PRG Preliminary Remediation Goal
- mg/kg milligram per kilogram
- PCB Polychlorinated biphenyl

Residential PRG (EPA, 2000)

- As = 1.5*mg/kg
- Cd = 9.0 mg/kg
- PCB = 0.22 mg/kg
- Chlordane = 1.6 mg/kg

- * Background
- B Value is greater than instrument detection limit but less than Contract Required Detection Limit
- C Pesticide/PCB result confirmed by GC/MS
- P Used to flag concentrations where there is greater than 25% difference in second column confirmation result



Locations with Soil Contamination, AOC 40 Former Norton AFB, California

Figure 2

1.3 REMEDIAL OBJECTIVES

As presented in the work plan, the objectives of the closure of AOC 40 included removal of the remaining sheds in and adjacent to AOC 40, associated debris, and soil with contaminant concentrations exceeding residential PRGs. The FS (CDM Federal 2003) indicates that removal of the soil provides long-term effectiveness and permanence by eliminating the contamination from the site and avoids the need for institutional controls (IC). Thus this report details the activities undertaken to attain these objectives, and presents the analytical data for determining that this site requires no further action.

2.0 REMEDIAL ACTION IMPLEMENTATION

AOC 40 is the area identified as the golf course maintenance area and is contained within the former IWTP fence enclosure. The area consisted of a series of metal sheds built upon wooden or concrete foundations and floors. It was used by the golf course maintenance group to store and mix a variety of pesticides, herbicides, and fungicides. Various reported spills and leaks have occurred in the past and as a result, small areas of soil have been impacted.

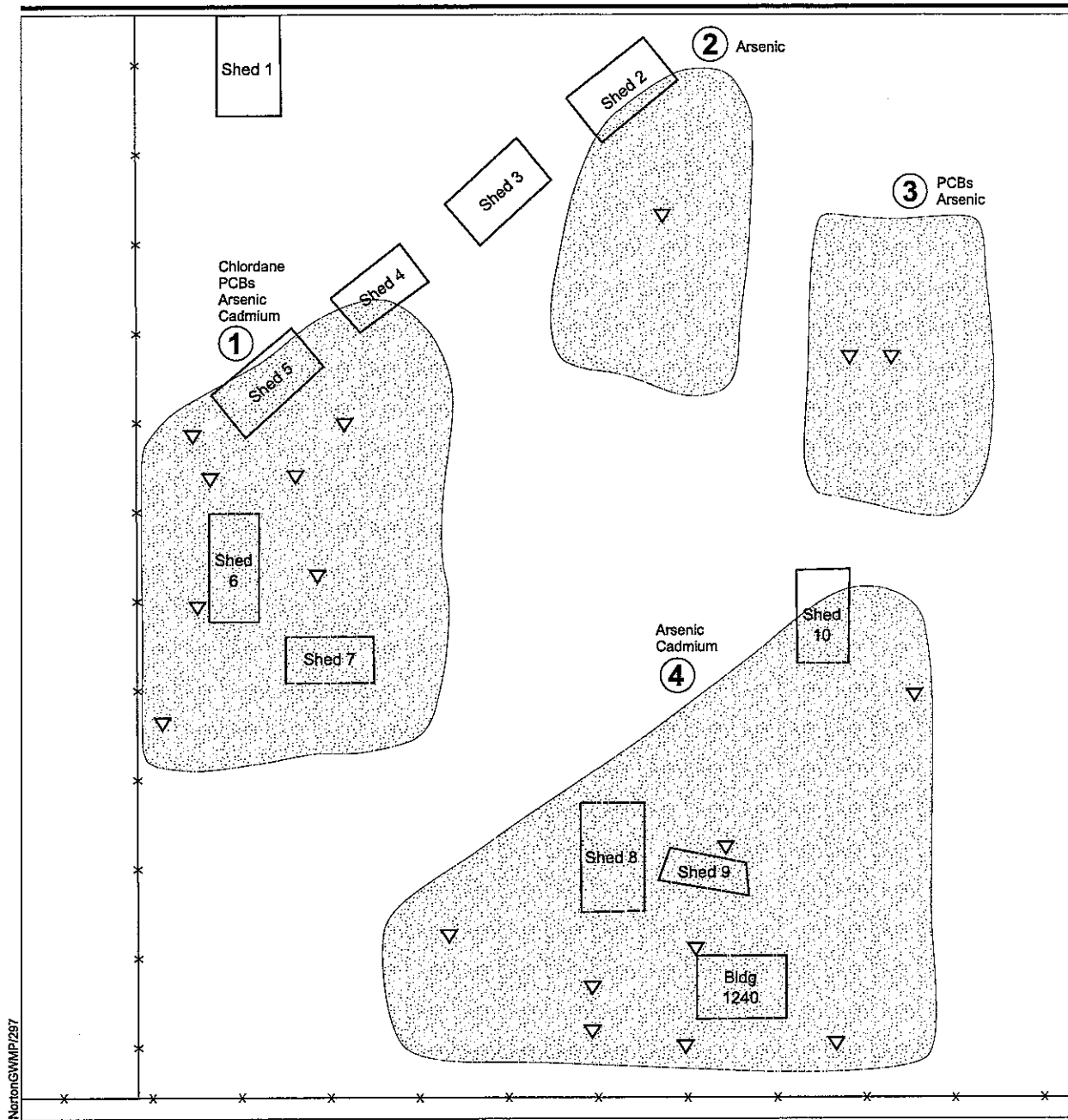
The remedial action for the site began on December 15, 2003, and consisted of the demolition of eleven metal sheds, removal of concrete foundations and wooden floors, and excavation and removal of soil contaminated with PCBs, chlordane, and metals. The following sections will describe the key activities that were performed during the remedial process. Also, analytical data from confirmation soil samples collected after the soil removal will be presented. Key activities included:

- Locating previously defined contaminated areas
- Removal of remaining metal sheds, floors, and foundations
- Removal of surface and shallow subsurface soil within previously defined contaminated areas
- Constructing a grid of sampling locations across the site, collection of surface soil samples at each location, and analyzing for contaminants of concern (COCs) to verify that contaminated soil has been removed
- Grading and leveling the area
- Disposing of asphalt, concrete, metal, soil, decontamination water, and personal protection equipment waste in approved disposal facilities.

2.1 AREAS OF CONTAMINATION

Numerous surface and shallow subsurface (2 feet below ground surface [bgs]) soil samples were collected during the confirmation study (CS) (CDM Federal 1995) and expanded source investigation (ESI) (CDM Federal 1996). The analysis of these samples indicated that numerous small areas were impacted by one or more of the COPCs, including chlordane, PCBs, cadmium, and arsenic. Figure 2 displays the locations where COPC concentrations exceeded the clean-up goals, and Figure 3 shows the areas that were proposed as requiring soil removal (Earth Tech 2003).

Prior to removal of the sheds, the locations of previously defined "hot spots" were identified using figures from previous publications. The WP (Earth Tech, 2003) identified four areas for removal that would include all of the "hot spots." Essentially each area was assigned one or more COCs according to analytical results from previous investigations. Area 1 contained arsenic, cadmium, PCBs, and chlordane at concentrations above clean-up goals in one or more sampling locations. At Area 2, only arsenic was found at values greater than the clean-up goals. Area 3 was found to contain arsenic and PCBs in concentrations greater than clean-up goals. At Area 4, arsenic and cadmium were the COCs found to exceed clean-up goals. Table 2-1 identifies the clean-up goals used for this site.



EXPLANATION

- ▽ Soil Sampling Location Exceeding Residential PRGs
- Removal Area
- ④ Removal Area Designation

Proposed Soil Removal Areas, AOC 40 Former Norton AFB, California

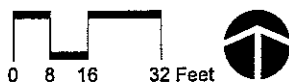


Figure 3

Table 2-1. Contaminants of Concern and Target Clean-up Goals

Contaminant of Potential Concern	Clean-up Goal (mg/kg)	Rationale
PCBs	0.22	U.S. EPA Region 9 Residential PRGs
Chlordane	1.6	U.S. EPA Region 9 Residential PRGs
Arsenic	1.5*	Background at Norton
Cadmium	9.0	California Modified Residential PRGs

Note: * Based on background levels of arsenic at Norton AFB.

EPA = Environmental Protection Agency

mg/kg = milligrams per kilogram

PCB = polychlorinated biphenyl

PRG = preliminary remediation goal

Once the removed areas were defined, wooden stakes were set at the corners of the area boundary lines. Also, each building corner was surveyed relative to a known location, and the removal area boundaries were identified using a handheld global positioning system (GPS).

2.2 DEMOLITION OF MAINTENANCE SHEDS

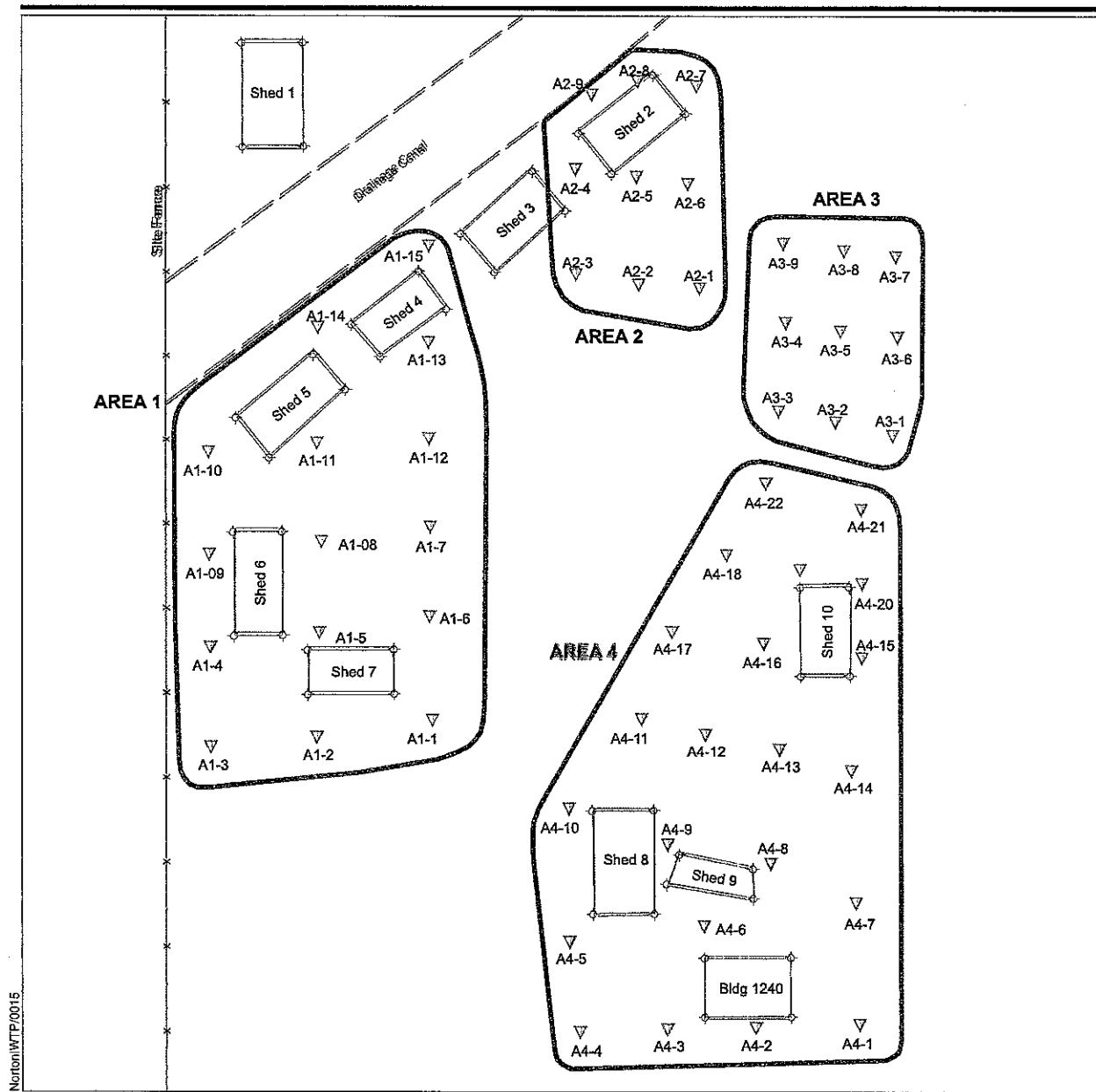
Demolition of the metal sheds began once the soil removal areas had been defined and marked. A total of 11 metal sheds averaging 24 feet long by 12 feet wide by 10 feet high (Figure 3) were demolished. All but 2 of the sheds contained wood floors and concrete/asphalt aprons. One of the sheds measured 28 feet long by 20 feet wide by 15 feet high, and included an asphalt floor. The largest shed measured 34 feet long by 25 feet wide by 10 feet high, and included a concrete floor that was as much as 2 feet thick. Demolition of the buildings was accomplished by collapsing the structure using an excavator and large loader. The metal frames and corrugated tin were moved to a central location on site, and placed in trucks for transport to a metal recycling facility. Concrete floors and foundations were broken into manageable pieces using a backhoe-mounted hydraulic breaker, then loaded into trucks, and transported to a concrete recycling facility. Wood, insulation, and other building debris were separated out, and hauled to a local landfill facility for proper disposal or recycling. Selected photos from the site have been included in Appendix A.

2.3 REMOVAL OF SOIL

2.3.1 Phase I Removal and Confirmation Sampling

As described above, the 18 previous sampling locations served as reference points for identifying potentially contaminated areas of soil recommended for remediation in previous studies (Figure 2). These points essentially defined four areas of soil contamination as shown in Figure 3. Following the building demolition and removal, a rubber-wheeled loader with bucket was used to remove soil within each of the four defined areas. The soil was removed in a single 6-inch lift and the removal was completed on December 24, 2003. Figure 4 displays the approximate boundaries and shapes of each of the four areas of soil actually removed. Soil from each area was placed in a separate stockpile adjacent to its respective area. No underground utilities or piping was encountered during the removal activities.

After the soil removal work was completed, sampling locations for the collection of confirmation soil samples were established within each of the 4 areas. In accordance with the work plan, a sampling grid was established in each area. The first location within each of the removal areas was placed relative to the southeastern corner of the respective area. Subsequent locations were placed relative to the first location, and were placed such that they were evenly distributed within each area. The total number of



EXPLANATION

▽ Confirmation Sampling Location

A2-9 Sampling Location ID

Buildings

Removal Area

**AOC 40 Approximate
Extent of Initial Soil
Removal and
Confirmation Sample
Locations
Former Norton AFB**

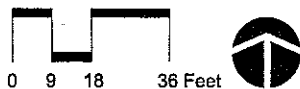


Figure 4

locations for each area was based on the proposed locations presented in the WP (Earth Tech, 2003). Figure 4 displays the layout of the sampling locations in each of the removal areas.

For Area 1, a total of 18 sampling locations were proposed, but only 15 locations were actually sampled. The reduction in locations was a result of a smaller area of removal than anticipated because a portion of Area 1 was limited by a northeast trending drainage canal (see Figure 4). Samples collected in this area were analyzed for arsenic and cadmium using U.S. Environmental Protection Agency (EPA) Method 6010B, PCBs using U.S. EPA Method 8082, and chlordane using U.S. EPA Method 8081A.

For Area 2, a total of 12 sampling locations were proposed, but only 9 locations were actually sampled. The reduction in locations was a result of a smaller area of removal than anticipated. The northern portion of Area 2 is limited by the same northeast trending drainage canal that affects Area 1 (see Figure 4). Samples collected in this area were analyzed for arsenic using U.S. EPA Method 6010B.

For Area 3, a total of nine sampling locations were proposed, and nine locations were actually sampled (see Figure 4). Samples collected in this area were analyzed for arsenic using U.S. EPA Method 6010B, and PCBs using U.S. EPA Method 8082.

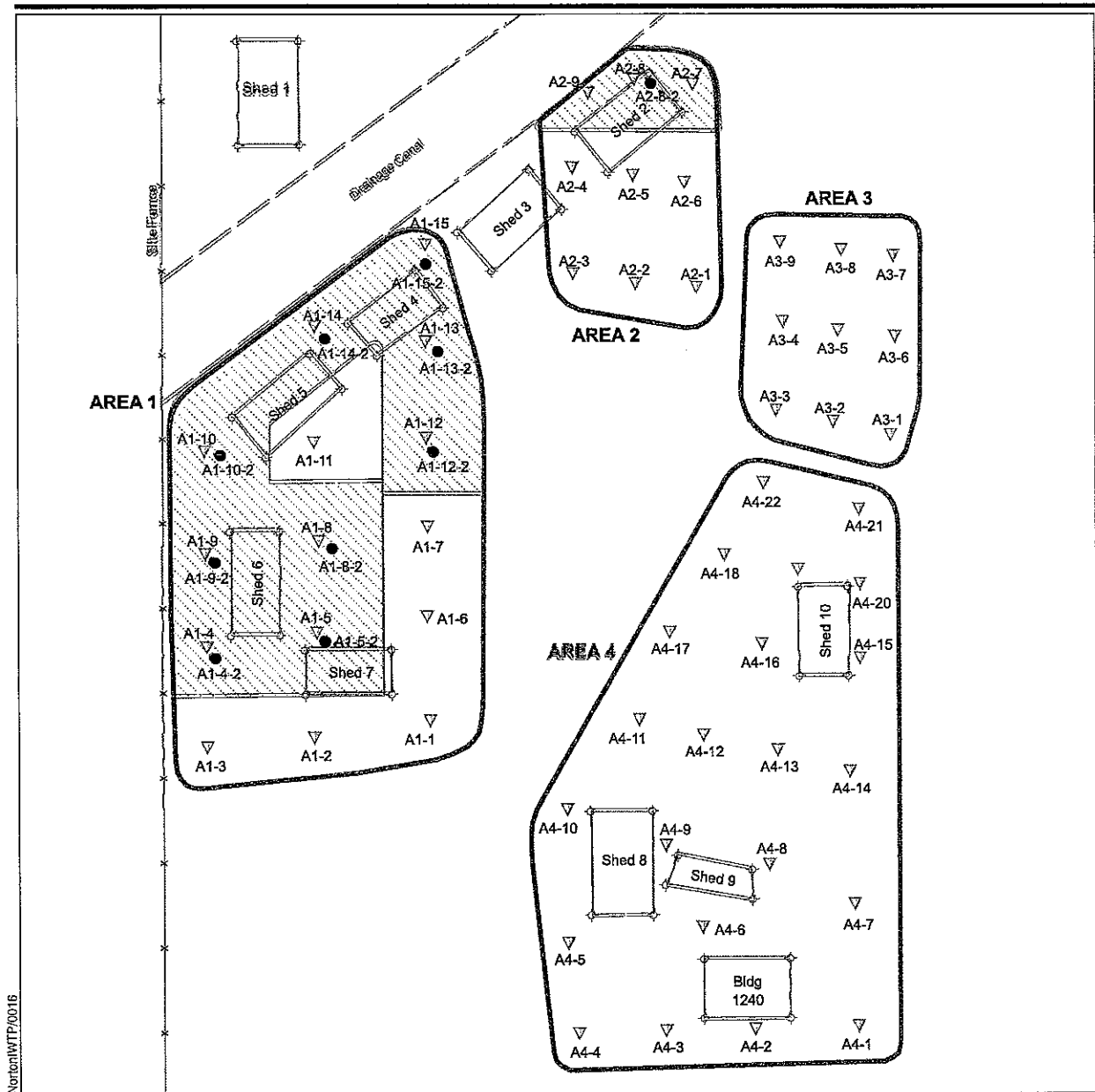
For Area 4, a total of 20 sampling locations were proposed, but 22 locations were actually sampled. The actual size of the removal area was made slightly larger than that proposed in the WP (Earth Tech, 2003), and as such, more locations were necessary to adequately cover the area (see Figure 4). Samples collected in this area were analyzed for arsenic and cadmium using U.S. EPA Method 6010B.

Soil samples were collected immediately adjacent to the flagged points using sterile disposable plastic scoops. The soil was scooped into a sterile disposable plastic bag, thoroughly mixed, and then poured into a sterile glass jar. Each jar was labeled with the sample identification number, placed in a plastic bag, then into an ice-filled cooler for shipment to the laboratory. A chain-of-custody (CoC) form was properly filled out and accompanied each cooler to the laboratory. Sample locations were identified on the basis of the area number designation and sequential sampling point, thus the first sample location in Area 1 was designated A1-1, the second sample location was identified as A1-2, and so on. Soil sample identification numbers were assigned sequentially based on the area number designation being sampled, thus the first surface soil confirmation sample collected in Area 1 at location number 1 was designated A40-A1-CS-001-D0.0, the second sample collected in Area 1 at location number 2 was designated A40-A1-CS-002-D0.0. Duplicate samples were identified by incrementing the left-most digit of the sequential portion of the sample ID, thus a duplicate for sample location number 8 in Area 2 was identified as A40-A2-CS-102-D0.0.

Detailed analytical results are discussed below; however, they indicated that two of the four areas still had COCs detected that exceeded the clean-up goals in one or more locations. Using the same removal process, an additional 6-inch lift was performed in and around the sampling points with COC concentrations greater than the clean-up goal. After the soil was removed, a second confirmation sample was collected immediately adjacent to the first confirmation sampling points where COC concentrations exceeded the clean-up goal. Figure 5 displays the outline of the first and second removal lifts, as well as the points where the second confirmation samples were collected.

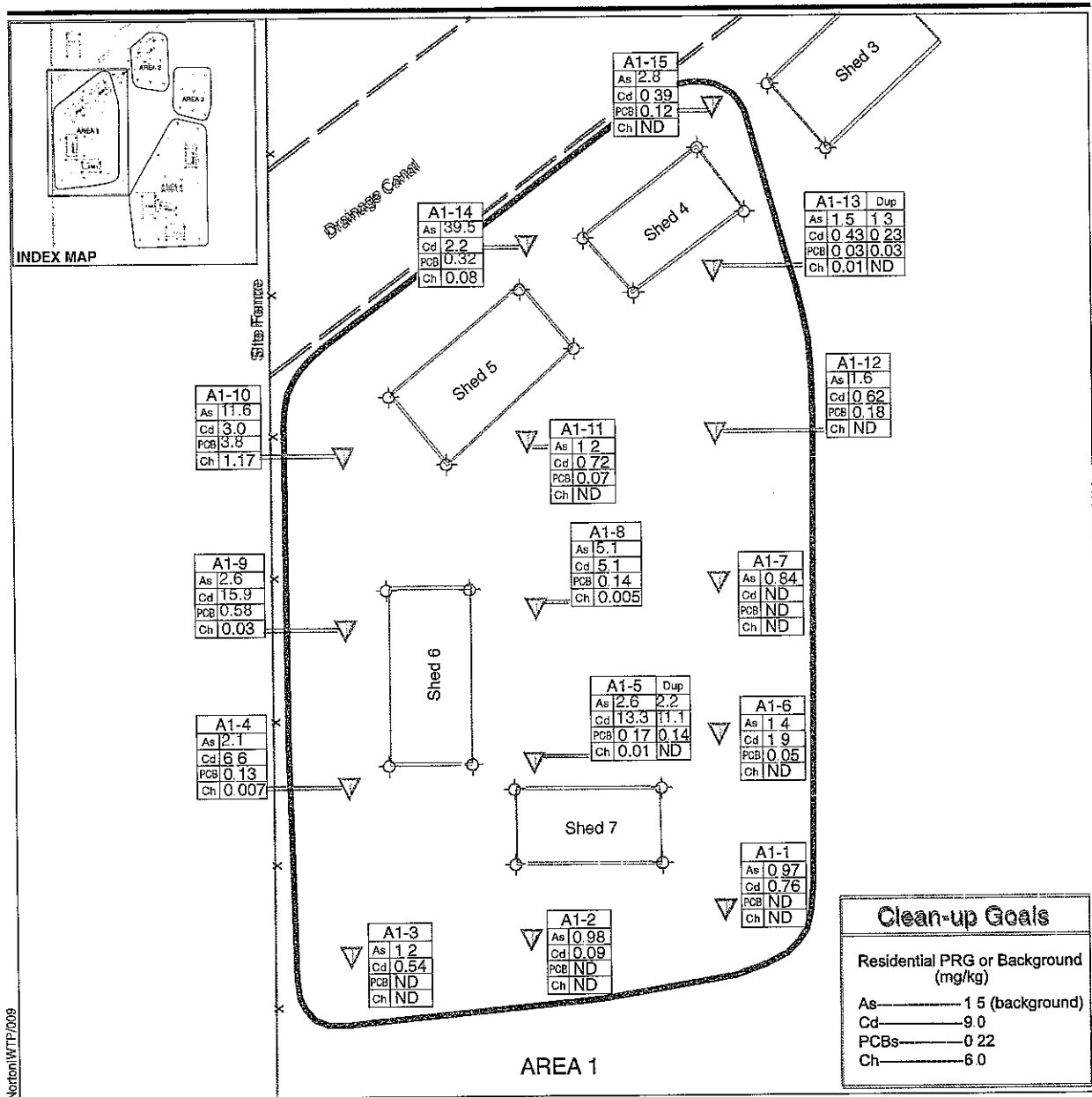
2.3.1.1 Analytical Results

Area 1. As indicated above, confirmation soil samples collected in Area 1 were analyzed for arsenic, cadmium, PCBs, and the pesticide chlordane. Figure 6 displays the sampling locations and associated analytical results from Area 1. Of the 15 samples collected in this area, 8 of them had



**AOC 40 Approximate
Extent of All Soil
Removal and
Confirmation Sample
Locations
Former Norton AFB**

Figure 5



EXPLANATION

▽ 1st Confirmation Sampling Location

A2-0 Sampling Location ID

▭ Buildings

COCs Chemicals of Concern

As Arsenic

Cd Cadmium

Ch Chlordane

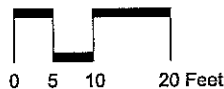
PRG Preliminary Remediation Goal

PCBs Polychlorinated Biphenols

mg/kg Milligram per Kilogram

Area 1 COCs: As, Cd, Ch, and PCBs

▭ Removal Area



Notes: Concentrations exceeding the cleanup goals are shown in red.
All concentrations shown in mg/kg

AOC 40 Soil Removal (1st) Confirmation Sampling Locations Area 1 Former Norton AFB

Figure 6

detections of one or more of the COCs for this area that exceeded clean-up goals. Of these, arsenic exceeded the clean-up goal of 1.5 mg/kg in each of the eight samples with the highest concentration of 39.5 mg/kg found at location A1-14. The lowest concentration was found to be 1.6 mg/kg in two of the eight samples. Cadmium concentrations exceeded the clean-up goal of 9.0 mg/kg in the samples collected from locations A1-9 and A1-5, with concentrations of 15.9 mg/kg and 13.3 mg/kg, respectively. PCB concentrations exceeded the clean-up goal of 0.22 mg/kg at the locations A1-9, A1-10, and A1-14 with concentrations of 0.58 mg/kg, 3.8 mg/kg, and 0.32 mg/kg, respectively. Chlordane concentrations did not exceed the clean-up goal of 6.0 mg/kg in any of the samples collected.

Area 2. Confirmation soil samples collected in Area 2 were analyzed for arsenic. Figure 7 displays the sampling locations and associated results from Area 2. Of the nine samples collected, four samples, including a duplicate, had concentrations of arsenic exceeding the clean-up goal of 1.5 mg/kg. The sample collected at location A2-8 had arsenic detected at only 1.2 mg/kg; however, the duplicate sample had arsenic at 10.9 mg/kg. The samples at locations A2-1, A2-7, and A2-8 had arsenic concentrations slightly above clean-up goals at 1.6 mg/kg, 1.7 mg/kg, and 1.8 mg/kg, respectively.

Area 3. Confirmation soil samples collected in Area 3 were analyzed for arsenic and PCBs. Figure 8 displays the sampling locations and associated results from Area 3. Of the nine samples collected, four of the samples had arsenic concentrations slightly exceeding the clean-up goal of 1.5 mg/kg. The sample collected at location A3-6 had the highest arsenic detected at a concentration of 2.2 mg/kg. The other three samples varied from 1.6 mg/kg at two locations (A3-1 and A3-7) to 1.9 mg/kg at A3-5. None of the samples had PCBs that exceeded the clean-up goal.

Area 4. Confirmation soil samples collected in Area 4 were analyzed for arsenic and cadmium. Figure 9 displays the sampling locations and associated results from Area 4. Of the 22 samples collected, 10 of the samples had arsenic concentrations slightly exceeding the clean-up goal of 1.5 mg/kg. The sample collected at location A4-16 contained an arsenic concentration of 3.0 mg/kg while the other nine samples had arsenic concentrations that varied from 2.3 mg/kg (A4-6) to 1.6 mg/kg (A4-8 and A4-18). A duplicate sample collected from location A4-19 contained cadmium at a concentration of 9.5 mg/kg, thus greater than the clean-up goal of 9.0 mg/kg.

Table 2-2 lists the sample location numbers, sample identification numbers, and analytical results for each of the confirmation samples collected after the first 6-inch lift of soil was removed. Actual laboratory reports are included in Appendix B.

2.3.2 Phase II Removal and Confirmation Sampling

As discussed above, the analytical results obtained from the post-removal confirmation soil samples indicated that portions of Areas 1 and 2 still contained concentrations of one or more COCs that exceeded the clean-up goals. Thus the Air Force elected to perform a second soil removal action within those portions of Areas 1 and 2. The soil was removed in another single 6-inch lift using a rubber wheeled loader with bucket. The removal was completed on March 5, 2004. The length and width of the second removal areas were approximately one-half the distance between sampling points with COC concentrations above clean-up goals and those sampling points with COC concentrations at or below the clean-up goals. The western limit of Area 1 was limited by the site boundary fence along the golf course, and the northern limit for both Areas 1 and 2 was limited by the drainage canal. Soil from each area was placed onto the stockpile adjacent to its respective area.

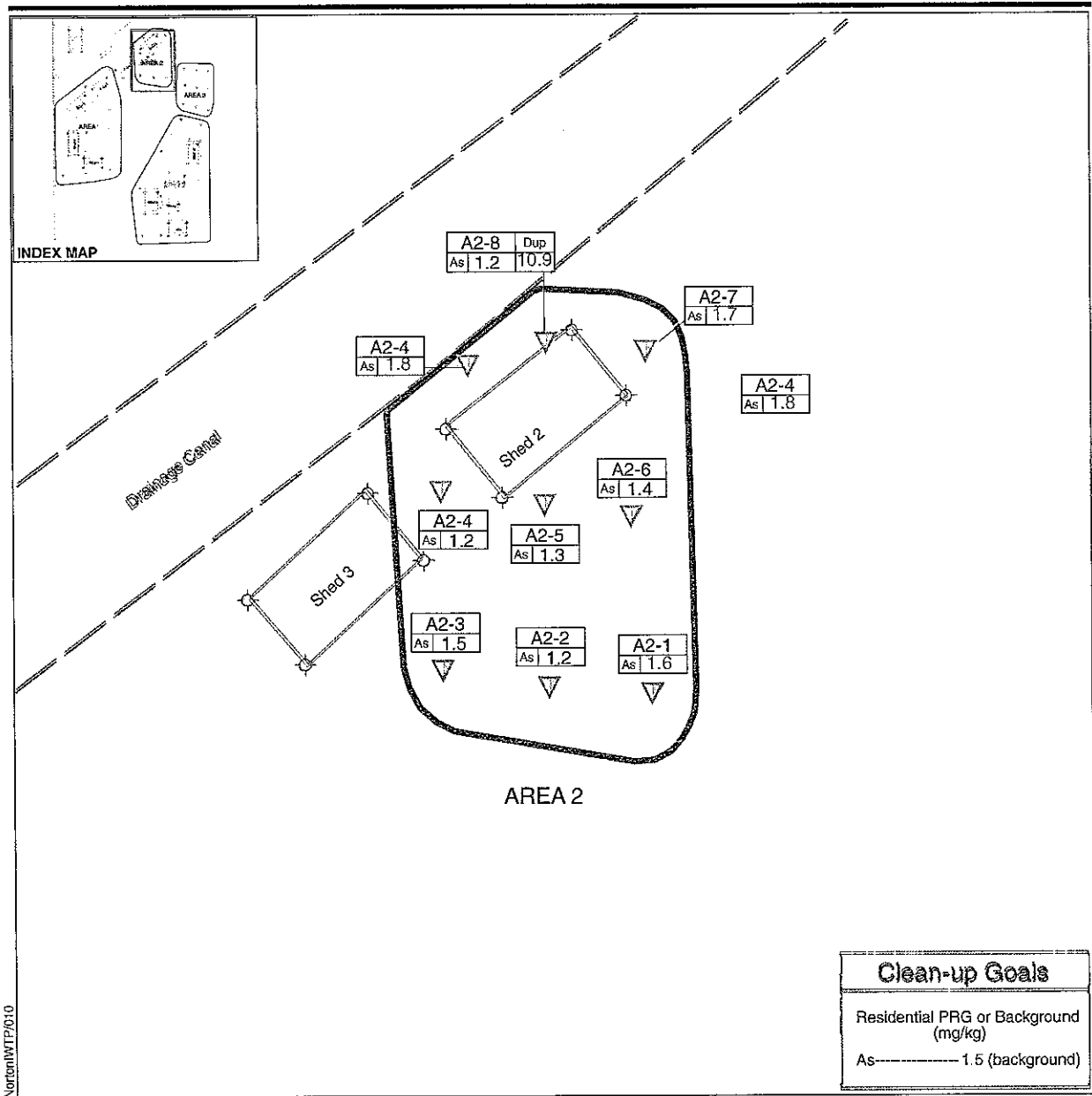


Figure 7

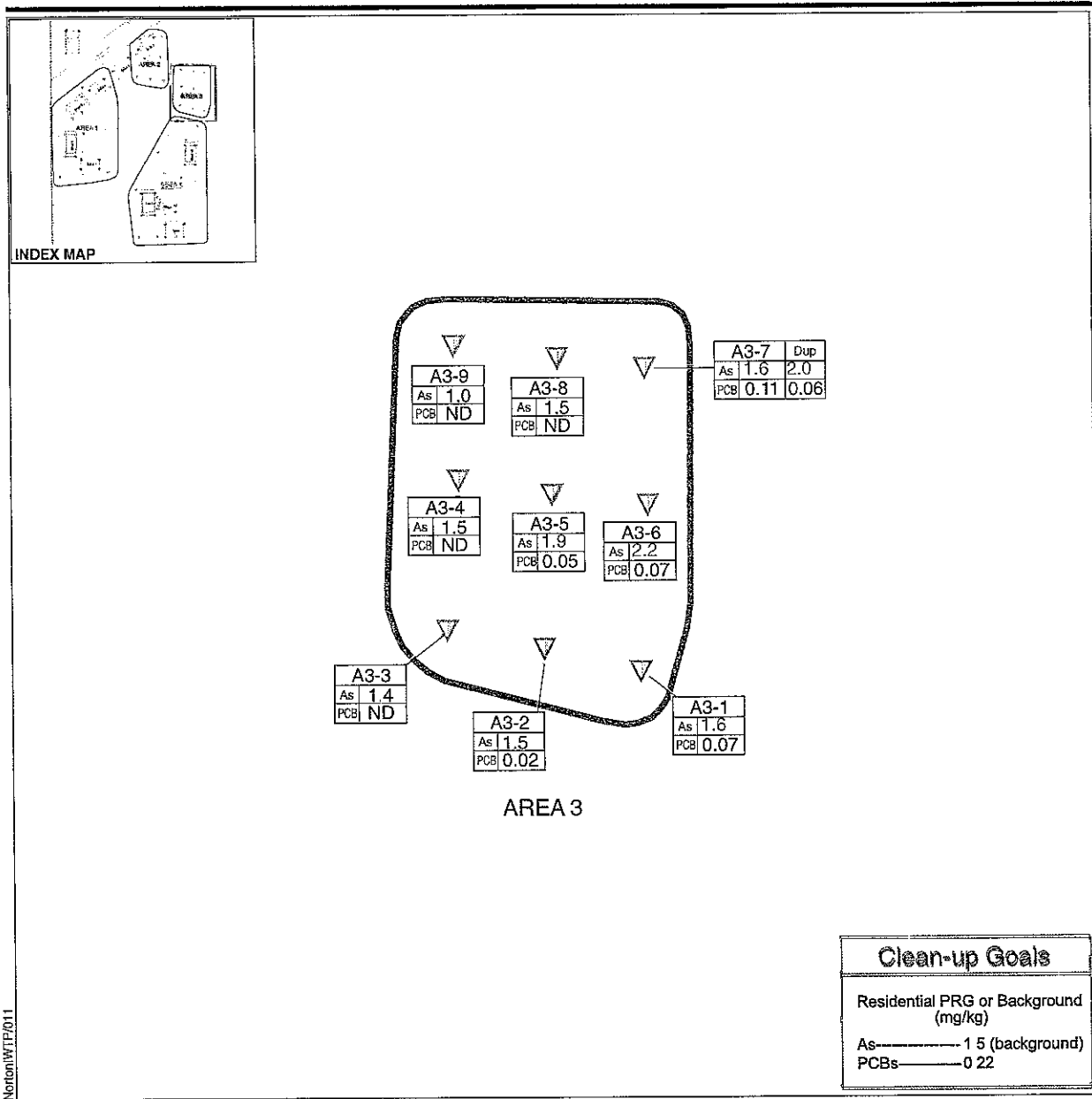
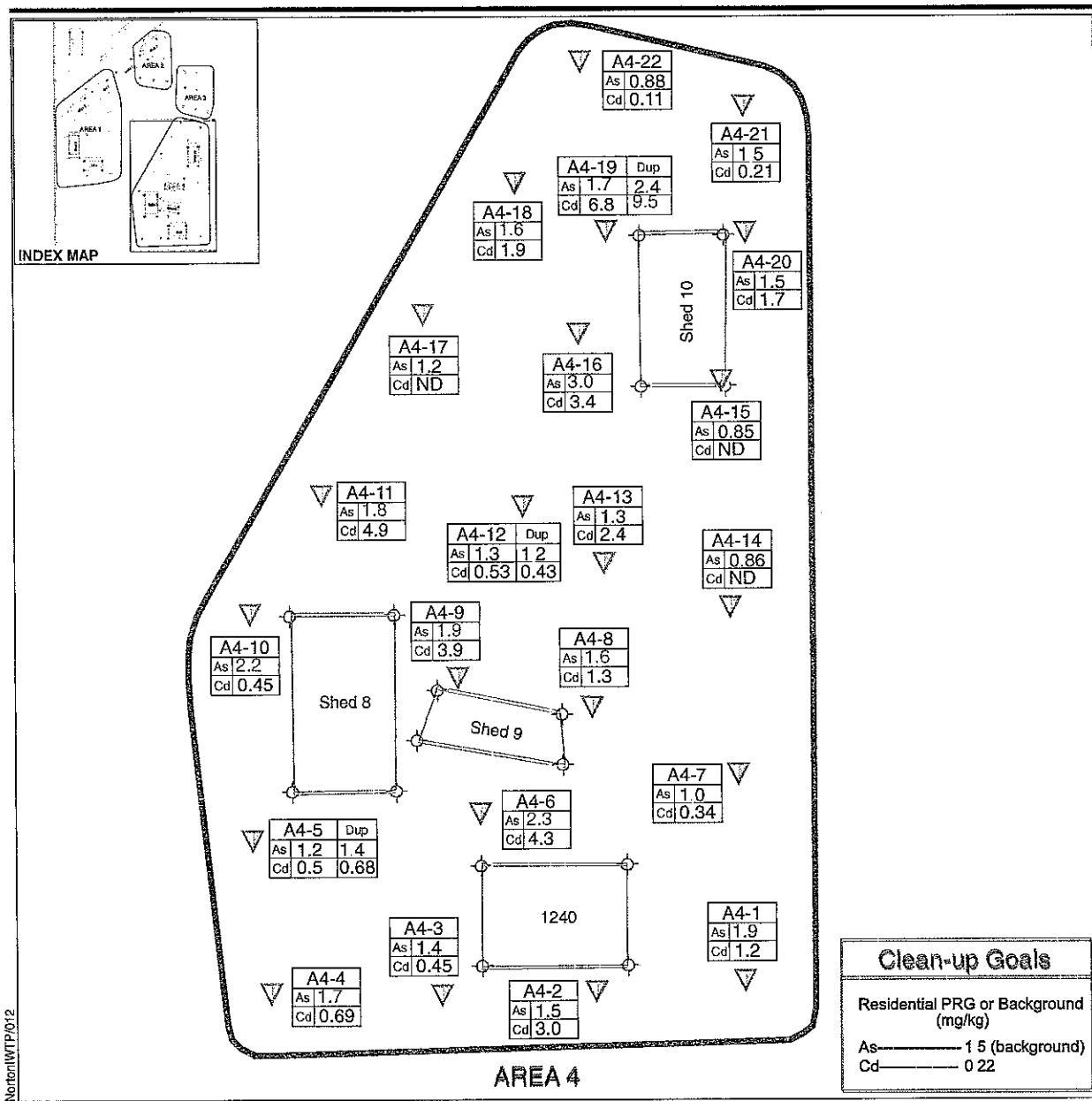


Figure 8



AOC 40 Soil Removal Confirmation Sampling Locations Area 4 Former Norton AFB

Figure 9

Table 2-2. Analytical Results from Confirmation Soil Samples: 1st Removal

Page 1 of 2

Location ID	Sample ID	PCBs (mg/kg)	Chlordane (mg/kg)	Arsenic (mg/kg)	Cadmium (mg/kg)
Area 1					
A1-1	A40-A1-CS-001-D0.0	ND	ND	0.97J	0.76
A1-2	A40-A1-CS-002-D0.0	ND	ND	0.98J	0.09J
A1-3	A40-A1-CS-003-D0.0	ND	ND	1.2	0.54J
A1-4	A40-A1-CS-004-D0.0	0.13	0.007J	2.1	6.6
A1-5	A40-A1-CS-005-D0.0	0.17	0.01J	2.6	13.3
	A40-A1-CS-105-D0.0 (Dup)	0.14	ND	2.2	11.1
A1-6	A40-A1-CS-006-D0.0	0.047	ND	1.4	1.9
A1-7	A40-A1-CS-007-D0.0	ND	ND	0.84J	ND
A1-8	A40-A1-CS-008-D0.0	0.14	0.005	5.1	5.1
A1-9	A40-A1-CS-009-D0.0	0.58	0.033	2.6	15.9
A1-10	A40-A1-CS-010-D0.0	3.8	1.27	11.6	3.0
A1-11	A40-A1-CS-011-D0.0	0.06J	ND	1.2	0.72
A1-12	A40-A1-CS-012-D0.0	0.18	ND	1.6	0.62
A1-13	A40-A1-CS-013-D0.0	0.03J	0.007	1.5	0.43J
	A40-A1-CS-113-D0.0 (Dup)	0.03J	ND	1.3	0.23J
A1-14	A40-A1-CS-014-D0.0	0.32	0.076	39.5	2.2
A1-15	A40-A1-CS-015-D0.0	0.12	ND	2.8	0.39J
Area 2					
A2-1	A40-A2-CS-001-D0.0	NA	NA	1.6	NA
A2-2	A40-A2-CS-002-D0.0	NA	NA	1.2	NA
A2-3	A40-A2-CS-003-D0.0	NA	NA	1.5	NA
A2-4	A40-A2-CS-004-D0.0	NA	NA	1.2	NA
A2-5	A40-A2-CS-005-D0.0	NA	NA	1.3	NA
A2-6	A40-A2-CS-006-D0.0	NA	NA	1.4	NA
A2-7	A40-A2-CS-007-D0.0	NA	NA	1.7	NA
A2-8	A40-A2-CS-008-D0.0	NA	NA	1.2	NA
	A40-A2-CS-108-D0.0 (Dup)	NA	NA	10.9	NA
A2-9	A40-A2-CS-009-D0.0	NA	NA	1.8	NA
Area 3					
A3-1	A40-A3-CS-001-D0.0	0.071	NA	1.6	NA
A3-2	A40-A3-CS-002-D0.0	0.024J	NA	1.5	NA
A3-3	A40-A3-CS-003-D0.0	ND	NA	1.4	NA
A3-4	A40-A3-CS-004-D0.0	ND	NA	1.5	NA
A3-5	A40-A3-CS-005-D0.0	0.048	NA	1.9	NA
A3-6	A40-A3-CS-006-D0.0	0.07	NA	2.2	NA
A3-7	A40-A3-CS-007-D0.0	0.11	NA	1.6	NA
	A40-A3-CS-107-D0.0 (Dup)	0.057	NA	2.0	NA
A3-8	A40-A3-CS-008-D0.0	ND	NA	1.5	NA
A3-9	A40-A3-CS-009-D0.0	ND	NA	1.0	NA
Area 4					
A4-1	A40-A4-CS-001-D0.0	NA	NA	1.9	1.2
A4-2	A40-A4-CS-002-D0.0	NA	NA	1.5	3.0
A4-3	A40-A4-CS-003-D0.0	NA	NA	1.4	0.45J
A4-4	A40-A4-CS-004-D0.0	NA	NA	1.7	0.69
A4-5	A40-A4-CS-005-D0.0	NA	NA	1.2	0.5J
	A40-A4-CS-105-D0.0 (Dup)	NA	NA	1.4	0.68
A4-6	A40-A4-CS-006-D0.0	NA	NA	2.3	4.3

Table 2-2. Analytical Results from Confirmation Soil Samples: 1st Removal
Page 2 of 2

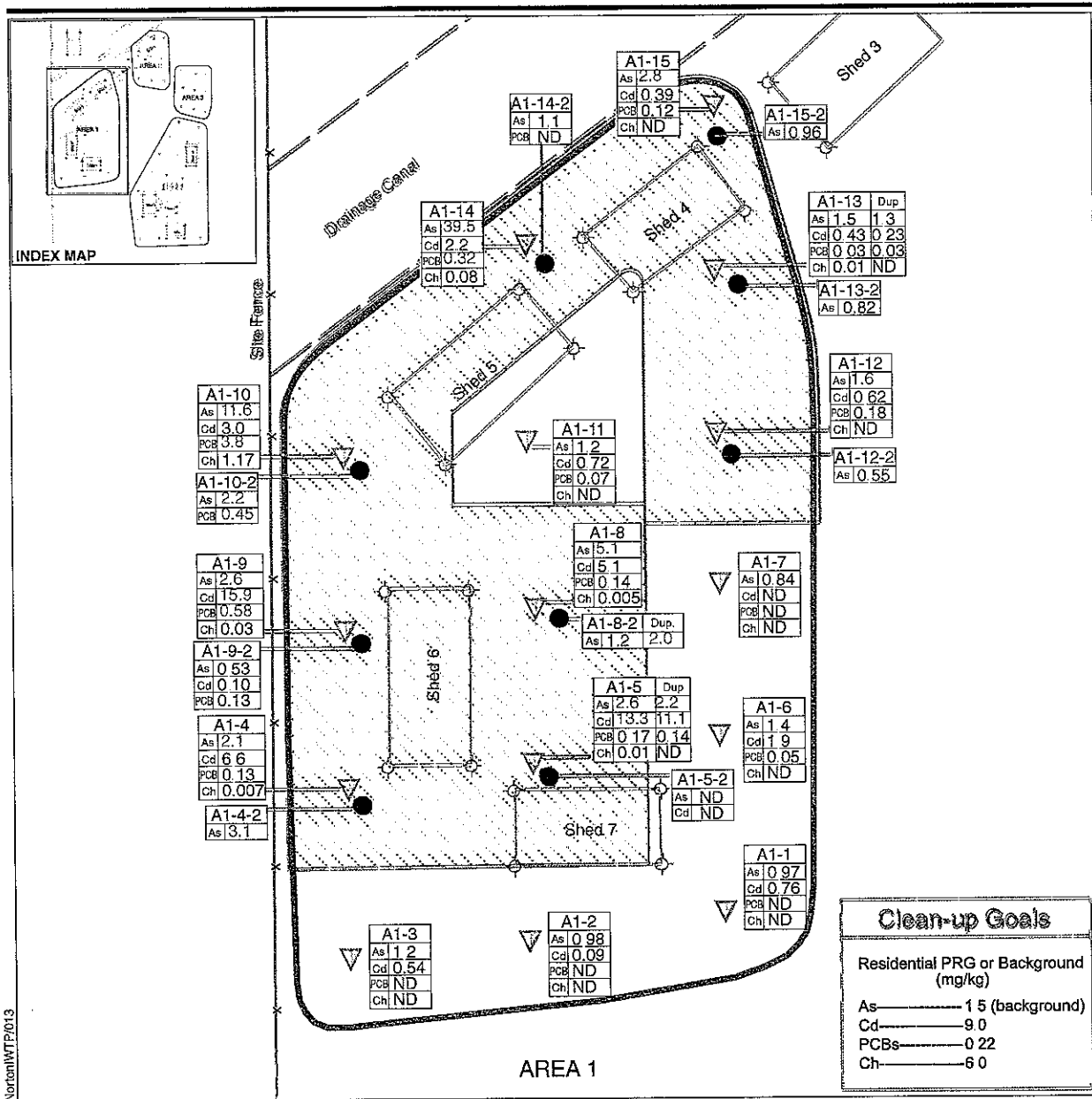
Location ID	Sample ID	PCBs	Chlordane	Arsenic	Cadmium
A4-7	A40-A4-CS-007-D0.0	NA	NA	1.0	0.34J
A4-8	A40-A4-CS-008-D0.0	NA	NA	1.6	1.3
A4-9	A40-A4-CS-009-D0.0	NA	NA	1.9	3.9
A4-10	A40-A4-CS-010-D0.0	NA	NA	2.2	0.45J
A4-11	A40-A4-CS-011-D0.0	NA	NA	1.8	4.9
A4-12	A40-A4-CS-012-D0.0	NA	NA	1.3	0.53
	A40-A4-CS-112-D0.0 (Dup)	NA	NA	1.2	0.43J
A4-13	A40-A4-CS-013-D0.0	NA	NA	1.3	2.4
A4-14	A40-A4-CS-014-D0.0	NA	NA	0.86J	ND
A4-15	A40-A4-CS-015-D0.0	NA	NA	0.85J	ND
A4-16	A40-A4-CS-016-D0.0	NA	NA	3.0	3.4
A4-17	A40-A4-CS-017-D0.0	NA	NA	1.2	ND
A4-18	A40-A4-CS-018-D0.0	NA	NA	1.6	1.9
A4-19	A40-A4-CS-019-D0.0	NA	NA	1.7	6.8
	A40-A4-CS-119-D0.0 (Dup)	NA	NA	2.4	9.5
A4-20	A40-A4-CS-020-D0.0	NA	NA	1.5	1.7
A4-21	A40-A4-CS-021-D0.0	NA	NA	1.5	0.21J
A4-22	A40-A4-CS-022-D0.0	NA	NA	0.88J	0.11J

Note: Shaded values indicate those concentrations that exceed clean-up goals
 Dup = duplicate sample
 J = estimated value
 mg/kg = milligram per kilogram
 NA = not analyzed
 ND = not detected
 PCB = polychlorinated biphenyl

After the second 6-inch lift was removed, initial confirmation sample locations with elevated COCs were restaked according to GPS coordinates and measured from stakes representing other undisturbed confirmation sampling locations. Soil samples were collected immediately adjacent to the former confirmation sample locations with COC concentrations greater than clean-up goals, and represented essentially the same locations as were sampled after the first removal, except now with an additional 6 inches of soil removed. The soil was scooped into a sterile disposable plastic bag using plastic disposable scoops, thoroughly mixed, and then poured into a sterile glass jar. Each jar was labeled with the sample identification number, placed in a plastic bag, then into an ice-filled cooler for shipment to the laboratory. A CoC form was properly filled out and accompanied each cooler to the laboratory.

2.3.2.1 Analytical Results

Area 1. As discussed above, a total of eight confirmation samples had one or more COCs with concentrations exceeding the clean-up goals after the first removal. These eight locations where COCs were found to exceed clean-up goals after the first removal were sampled again after the second removal, and analyzed for arsenic, cadmium, and PCBs (Figure 10). The sample collected at A1-4-2 had arsenic at 3.1 mg/kg, which exceeded the clean-up goal of 1.5 mg/kg. The sample collected at A1-8-2 had arsenic detected at a concentration of 2.0 mg/kg, 0.5 mg greater than the clean-up goal of 1.5 mg/kg. The sample collected at A1-10-2 was found to contain arsenic at a concentration of 2.2 mg/kg, and a PCB concentration of 0.45 mg/kg, thus exceeding the clean-up goals of 1.5 mg/kg for arsenic and 0.22 mg/kg for PCBs. None of the other samples had detections of the COCs greater than the clean-up goals. The second removal substantially reduced the concentrations of arsenic, cadmium, and PCBs to near or below the clean-up goals.



**AOC 40 Soil Removal
Final Confirmation
Sampling Locations
Area 1
Former Norton AFB**

Figure 10

Area 2. After the first removal at Area 2, the confirmation sample (duplicate) at A2-8 had an arsenic concentration of 10.9 mg/kg. Two other samples adjacent to it, namely A2-7 and A2-9, had arsenic concentrations of 1.7 mg/kg and 1.8 mg/kg, respectively, thus slightly exceeding the clean-up goal of 1.5 mg/kg. After the second removal action (Figure 11), another confirmation soil sample was collected at location A2-8-2. Arsenic was found at a concentration of 2.2 mg/kg, 0.7 mg/kg greater than the clean-up goal but substantially less than the 10.7 mg/kg concentration detected in the duplicate of the confirmation sample collected after the first removal.

Table 2-3 lists the sample identification numbers and analytical results for each of the confirmation samples collected after the second 6-inch lift of soil was removed. Figures 10 and 11 depict the sampling results from the first and second confirmation sampling events for Area 1 and 2, respectively. It shows that the two soil removals were successful in reducing contaminant levels to near or below the clean-up goals. Actual laboratory reports are included in Appendix B.

Table 2-3. Analytical Results from Confirmation Soil Samples: 2nd Removal

Location Number	Sample ID	PCBs (mg/kg)	Chlordane (mg/kg)	Arsenic (mg/kg)	Cadmium (mg/kg)
Area 1					
A1-4-2	A40-A1-CS-204-D0.0	NA	NA	3.1	NA
A1-5-2	A40-A1-CS-205-D0.0	NA	NA	ND	ND
A1-8-2	A40-A1-CS-208-D0.0	NA	NA	1.2	NA
	A40-A1-CS-308-D0.0 (Dup)	NA	NA	2.0	NA
A1-9-2	A40-A1-CS-209-D0.0	0.13	NA	0.53J	0.10J
A1-10-2	A40-A1-CS-210-D0.0	0.45	NA	2.2	NA
A1-12-2	A40-A1-CS-212-D0.0	NA	NA	0.55J	NA
A1-13-2	A40-A1-CS-213-D0.0	NA	NA	0.82J	NA
A1-14-2	A40-A1-CS-214-D0.0	ND	NA	1.1	NA
A1-15-2	A40-A1-CS-215-D0.0	NA	NA	0.96J	NA
Area 2					
A2-8-2	A40-A2-CS-208-D0.0	NA	NA	2.2	NA

Note: Shaded values indicate those concentrations that exceed clean up goals

Dup = duplicate sample
 J = estimated value
 mg/kg = milligram per kilogram
 NA = not analyzed
 ND = not detected
 PCB = polychlorinated biphenyl

2.4 QUALITY CONTROL/QUALITY ASSURANCE

Quality assurance/quality control (QA/QC) reviews of the laboratory analytical data discussed above were performed as specified in the QA/QC section of the work plan (Earth Tech 2003). The laboratory data were reviewed by the Earth Tech QA/QC manager to ensure conformance with the QA/QC specifications. The data were reviewed for conformance procedures, effort levels, acceptance limits, and any corrective actions required. These procedures were followed to ensure that the data quality objectives (DQOs) as detailed in the work plan (Earth Tech 2003) were met. The data collected during the field investigation are being used to document the soil conditions at AOC 40 now that the remedial activities have been completed.

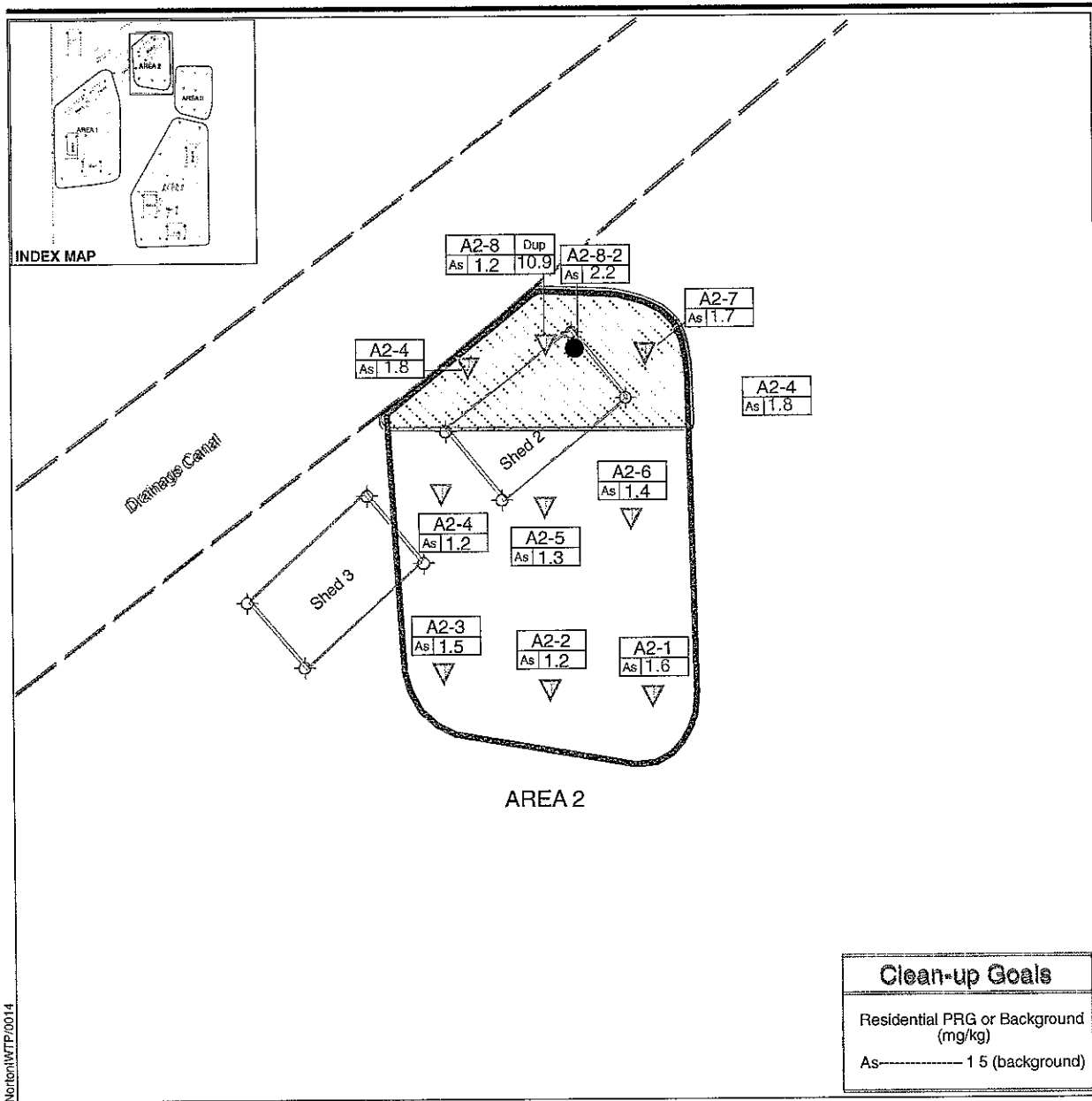


Figure 11

For the confirmation samples collected and analyzed by a fixed laboratory, a specific data validation was conducted. Based on the results of the validation, none of the samples was classified as unusable. The sample identified as A40-A2-CS-008-D0 0 and its duplicate were analyzed for arsenic, and the results were in poor agreement. However, additional remedial action was taken based on the higher concentration of arsenic reported in the duplicate sample.

No ambient or equipment rinse samples were collected since the sampling equipment consisting of plastic scoops and plastic bags were disposed after each soil sample was collected.

Field activities and other pertinent information was documented in a waterproof, permanently bound field logbook with consecutively numbered pages. Entries were entered with waterproof black ink, and signed by the person recording the information. Recorded information in the logbook includes the following, where appropriate:

- Names of each person on the field team along with a field title.
- Weather conditions and other environmental conditions
- General description of daily field activities and associated times of occurrence
- Estimates of quantity of soil removed
- Date of entry, collection location, time, and identification for all samples collected

All sample containers had sample identification labels attached immediately after the sample had been collected. Each label displayed the pertinent information about the sample, including the identification number, the date and time of collection, identification of the sample collector, the sample matrix, preservatives used, and the required analyses.

CoC procedures were used to document and identify each sample, its handling, and possession, including the time from collection through the arrival at the laboratory for analysis. The CoC forms clearly identified the project name, the samplers or sample collectors, the sample identification (ID), date and time of collection, the matrix, numbers and types of containers, and the analyses required. In addition, each CoC provided sufficient signature spaces to properly account for each transfer point and the person responsible. A laboratory signature space was used to show acceptance of the samples by the laboratory. After the samples and CoCs were placed in iced-filled coolers, custody seals consisting of strips of adhesive paper were used to show that the samples not been tampered with during transport.

2.5 WASTE MANAGEMENT

Management of waste soil produced during the removal, sampling, and restoration activities was performed such that all regulatory requirements were met. The amount of waste generated and handled was minimized during all phases of the work performed. All solid waste such as building debris, concrete, and vegetation was transported off site as it was collected. Waste soil generated during soil removal operations was placed into stockpiles adjacent to each of the four removal areas.

Composite soil samples from each of the stockpiles were collected for waste soil profiling and disposal classification. Each of the four composite samples were profiled for TPH as gasoline, diesel, and motor oil; SVOCs; pesticides; PCBs; and California priority pollutant metals. Analytical results indicated that no pesticides or SVOCs were detected. No metals were detected at concentrations that exceed unrestricted

disposal requirements. Gasoline, diesel, and motor oil were not detected. An unknown hydrocarbon was found in all four samples at concentrations ranging from 130 to 230 mg/kg. Finally, PCBs were detected in all four samples and varied in concentration from a low of 0.046 mg/kg to a high of 0.17 mg/kg. Based on the analytical results, the soil was determined to be nonhazardous, and was transported under nonhazardous waste manifests to a nearby soil reclamation facility. Approximately 660 tons of soil were removed from the site.

Asphalt, concrete, metal waste, and plant/tree debris was classified as nonhazardous waste and was transported off site by the subcontractor to an approved waste disposal facility or recycling center. Plant/tree debris included sod/soil, palm tree frawns, and other green waste from the golf course. In the past, the golf course maintenance department removed tree and plant debris as well as sod/soil from the golf course. This material was apparently placed on the east side of the site in small mounds. During the soil excavation, loading and disposal of this material was also removed and disposed properly.

2.6 SITE RESTORATION

Site leveling occurred following removal of building debris, excavation, and waste soil. A front-mounted straight blade on a rubber-wheeled tractor was used to level and smooth the surface of the excavation areas. The overall grade of the site was preserved; however, no material was brought to the site for backfilling the excavations. Any leftover building material or other demolition debris was collected and disposed off site.

3.0 REMEDIAL ACTION PERFORMANCE

The following sections summarize and discuss the effectiveness of the remedial actions performed at AOC 40. They provide data regarding the soil removal action and confirmation sampling results, and an evaluation of achievement of the clean-up objectives as well as compliance with regulatory requirements.

3.1 SOIL REMOVAL SUMMARY

The four excavations at AOC 40 yielded approximately 440 cubic yards or 660 tons of waste soil. The soil was profiled and disposed/recycled at a properly permitted disposal facility. Figure 5 shows the approximate final configuration of the four excavations as well as the outline of the additional soil removed at Areas 1 and 2. The final depth of the excavations for Areas 1 and 2 was deeper in some parts than what was proposed in the WP due to some COC concentrations exceeding clean-up goals after the initial confirmation sample were collected. The total depth of removal for the four excavations was approximately 6 inches, except for certain portions of Areas 1 and 2 where an additional 6-inch lift was performed. Details of the additional removal in Areas 1 and 2 are shown in Figures 10 and 11.

It appears that the arsenic, cadmium, chlordane, and PCB contamination found at the site was likely a result of past golf course personnel performing duties for the maintenance of the turf. Golf courses commonly use pesticides and herbicides to control both insect activity and weed growth. The contamination at AOC 40 may have occurred during the storage, mixing, and use of these compounds. Based upon past studies (CDM 1995a, 1996) and this remedial action, contaminants were found to be confined to soil in the near-surface (12 inches or less). That the site was used as a golf course maintenance area would suggest that any contaminants in the soil would likely be shallow since only small quantities of the compounds came in contact with the soil.

3.1.1 Confirmation Sampling Evaluation

Phase I (First Removal)

A 6-inch soil lift was performed on each of the designated areas, and after establishment of confirmation sample locations, confirmation soil samples were collected and analyzed for the COCs established for each of the areas. A total of 55 confirmation soil samples, including 7 duplicates were collected from grids established within each of the 4 areas when the 6-inch lift was completed. Figures 6 through 9 display the results.

Area 1. Analytical results indicated that either one or more of the COCs arsenic, cadmium, or PCB concentrations exceeded clean-up goals in eight sampling locations. Arsenic was detected at a concentration exceeding the clean-up goal of 1.5 mg/kg in eight samples with a maximum concentration of 39.5 mg/kg in sample A1-CS-014-D0.0. Cadmium was detected at a concentration exceeding the clean-up goal of 9.0 mg/kg in two samples with a maximum concentration of 15.9 mg/kg in sample A1-CS-009-D0.0. PCBs were detected at concentrations exceeding the clean-up goal of 0.22 mg/kg in three samples with a maximum concentration of 3.8 mg/kg in sample A1-CS-010-D0.0.

Area 2. Analytical results indicated that arsenic exceeded the clean-up goal at four sampling locations and was detected at a maximum concentration of 10.9 mg/kg in duplicate sample A2-CS-108-D0.0; however, the original sample found arsenic at only 1.2 mg/kg, well below the clean-up goal of 1.5 mg/kg.

Area 3. Analytical results indicated that arsenic slightly exceeded the clean-up goal at 4 sampling locations. It was detected at a maximum concentration of 2.2 mg/kg in sample A3-CS-006-D0.0, thus exceeding the clean-up goal of 1.5 mg/kg.

Area 4. Analytical results indicated that arsenic concentrations slightly exceeded clean-up goals in 10 sampling locations. It was detected at a maximum concentration of 3.0 mg/kg in sample A4-CS-016-D0.0, thus exceeding the clean-up goal of 1.5 mg/kg.

Phase II (Second Removal)

Based upon the first round of confirmation samples it was decided that an additional 6-inch soil lift would be removed on selected portions of Areas 1 and 2 to further reduce concentrations of COCs that exceeded the clean-up goals. Areas 3 and 4 only had arsenic at concentrations slightly exceeding the established background and thus additional soil removal was not considered necessary. After the second removal was complete, those sampling locations that contained the COC exceedances were reestablished and a total of 11 additional confirmation samples, including 1 duplicate, were collected from these locations. Figures 10 and 11 display the results.

Area 1. Following additional soil removal, a total of ten confirmation samples, including one duplicate, were collected in the area where the second lift was performed. The samples were analyzed for only those COCs that were found to be above the clean-up goal in that location's original confirmation sample. Of the ten samples, only two had detections of arsenic exceeding clean-up goals, with a maximum concentration of 3.1 mg/kg found at sample A1-CS-204-D0.0, and 2.2 mg/kg found at sample A1-CS-210-D0.0. Of the ten samples, only one had PCBs exceeding the clean-up goal of 0.22 mg/kg, with a concentration of 0.45 mg/kg found at sample A1-CS-210-D0.0.

Area 2. Following additional soil removal, one confirmation sample was collected in that portion of Area 2 where the second lift was performed. The sample was analyzed for arsenic only. For sample A2-CS-208-D0.0 arsenic was detected at a concentration of 2.2 mg/kg, slightly above the clean-up goal.

3.2 POST-REMEDIAL ACTION RISK ANALYSIS

3.2.1 Human Health Risk Assessment

Post-remedial human health risk was examined using the data from final confirmation samples collected from each of the four areas. Analytical results obtained after the first removal were omitted from the analysis if soil from that location was removed during the second removal. Final confirmation samples were collected at those locations and the resulting analytical data were incorporated into the risk model. Model scenarios included both industrial worker and child/adult residents. The analysis was conducted using those COPCs established during previous investigations. COPCs for this site that exceeded residential PRGs or established background, after the first removal, include the metals arsenic and cadmium, and PCBs.

The metal arsenic is problematic in that the established background for the entire former base is 1.5 mg/kg, and exceeds the California modified residential PRG of 0.39 mg/kg. Therefore, results from risk analysis would show some degree of increased risk even if no contamination was contributed from site activities. For AOC 40, the mean value of arsenic based on post-remedial confirmation sampling is 1.3 mg/kg, which is below the background but above the modified PRG. The 95% upper confidence limit (UCL) of the mean is 1.9 mg/kg, or just above the background concentration. This suggests that arsenic contamination at AOC 40 is more a result of natural occurrences rather than past activities associated with

the site. The exposure point concentration (EPC) used for the risk model was the 95% UCL value for arsenic. For the metal cadmium, an EPC of 8.2 mg/kg was used based on the maximum detected concentration for cadmium rather than the UCL.

Arochlor-1260 and Arochlor-1254 were the only post-remedial PCBs detected at AOC 40. A 95% UCL based EPC of 0.014 mg/kg for Arochlor-1260 and 0.13 mg/kg for Arochlor-1254 were used in the risk model.

Based on the EPCs noted above, both industrial and residential reuse scenarios were modeled under the risk analysis. Under a hypothetical industrial reuse scenario, a residual cancer risk of 1.0×10^{-6} for adult workers still remains at the site. This is equal to the excess cancer risk point of departure. The Hazard Index (HI) for the adult industrial worker is 0.02, well below the 1.0 departure point.

Using the same EPCs, a residential scenario was modeled. The child excess cancer risk is calculated as 9.5×10^{-6} and the adult excess cancer risk is 1.2×10^{-6} . The combined child/adult excess cancer risk is 1.1×10^{-5} resulting in a residual risk in the mid to lower portion of the risk management range. The non-cancer HI for children is 0.8 and the HI for adults is 0.027. Both of these values are below the HI point of departure value of 1.0. Risk tables with both industrial and residential calculations are contained in Appendix C.

As noted above, the presence of naturally occurring arsenic at this site is contributing most of the cancer risk in the model. For residential reuse, the metal arsenic alone contributes 8.7×10^{-6} to excess cancer risk for children, and 1.08×10^{-6} to excess cancer risk for the adult receptor.

3.3 REMEDIAL ACTION EFFECTIVENESS

The purpose of this removal action was to reduce concentrations of arsenic, cadmium, PCBs, and chlordane in soil to levels at or below established cleanup goals. Based upon the historical investigations and data from this remedial action it appears that some of the contamination found at AOC 40 was a direct result of golf course maintenance operations. Removal areas were established based on the COCs detected during previous investigations.

Analytical data from confirmation samples are a definitive way to measure the effectiveness of the removal action. For AOC 40, confirmation soil sample data at Areas 1 through 4 clearly show that soil removal has reduced the concentrations of all COCs to below or near their respective cleanup goals.

The removal action cleanup goal for PCB was based upon the residential PRG of 0.22 mg/kg. Only a single PCB confirmation result (located in Area 1) exceeded the residential PRG at 0.45 mg/kg.

The removal action cleanup goal for arsenic is based on the previously established background concentration of 1.5 mg/kg for the former base. The background value was developed using a range of values from 0.24 - 1.8 mg/kg from samples collected at points all around the former base (CDM Federal, 1995B). The background concentration exceeds the California modified PRG concentration of 0.39 mg/kg. The average arsenic concentration of the remaining soil at the site is 1.35 mg/kg at Area 1, 1.5 mg/kg at Area 2, 1.6 mg/kg at Area 3, and 1.6 mg/kg at Area 4. These average concentrations show that the site contributes essentially no additional cancer risk above background from past activities.

Chlordane and cadmium were not found at concentrations exceeding the cleanup goals.

The analytical results indicate little or no remaining contamination. Risk analysis shows that no apparent risk is present for industrial workers at the site, and a low excess cancer risk may exist for children and adults under a hypothetical residential development. Most of the risk is contributed from background arsenic concentrations, not by past activities at the site. In the future this site and surrounding area will likely be developed into a commercial or industrial area and not residential development. Therefore, based on the data presented in this report, it is recommended that AOC 40 be closed and no further action taken.

4.0 REFERENCES

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APPENDIX A

PHOTOS



Photograph 1-1. Shed Demolition



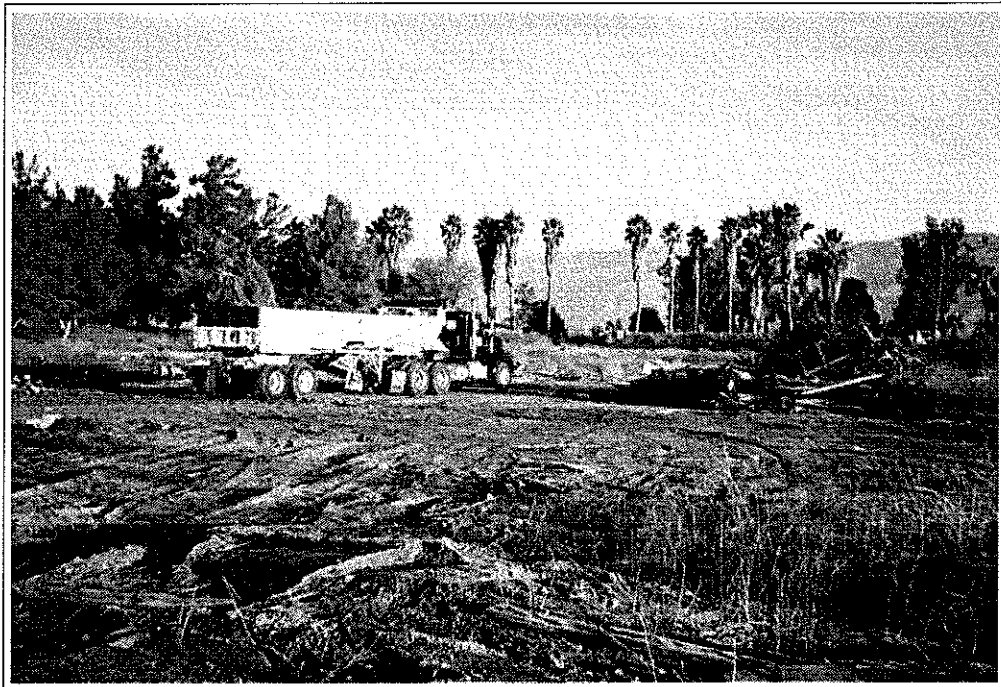
Photograph 1-2. Shed Demolition



Photograph 1-3. Shed Debris



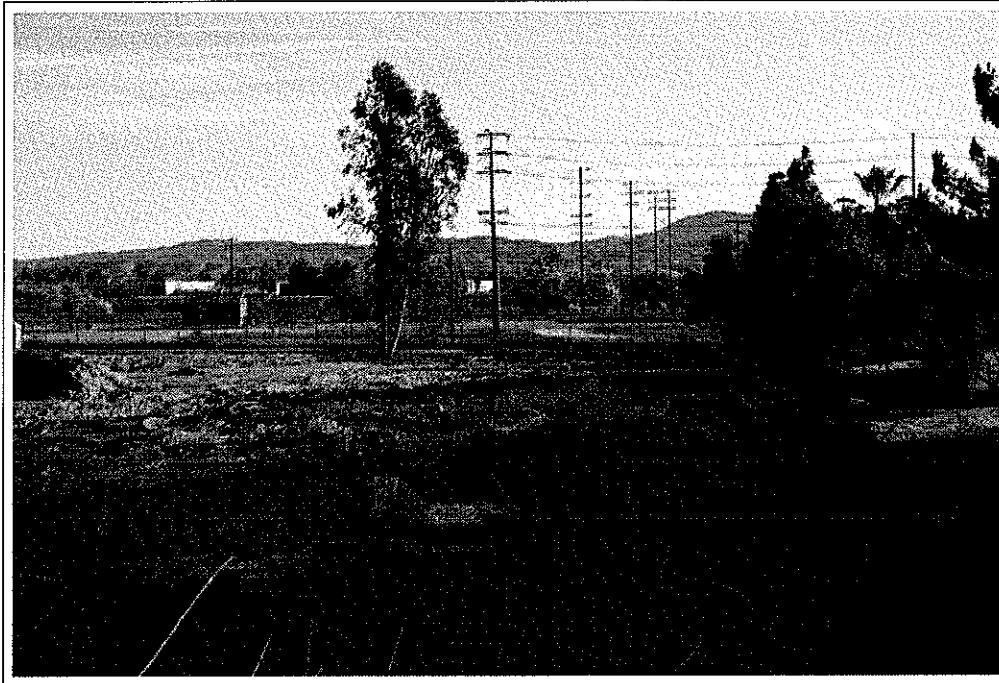
Photograph 1-4. Shed Debris



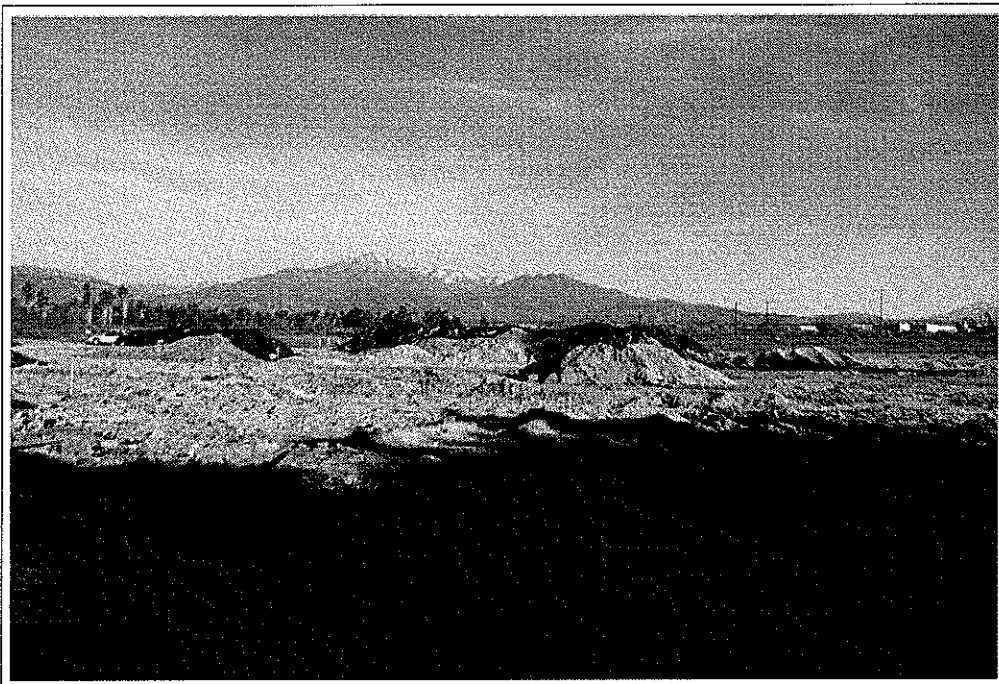
Photograph 1-5. Shed Debris



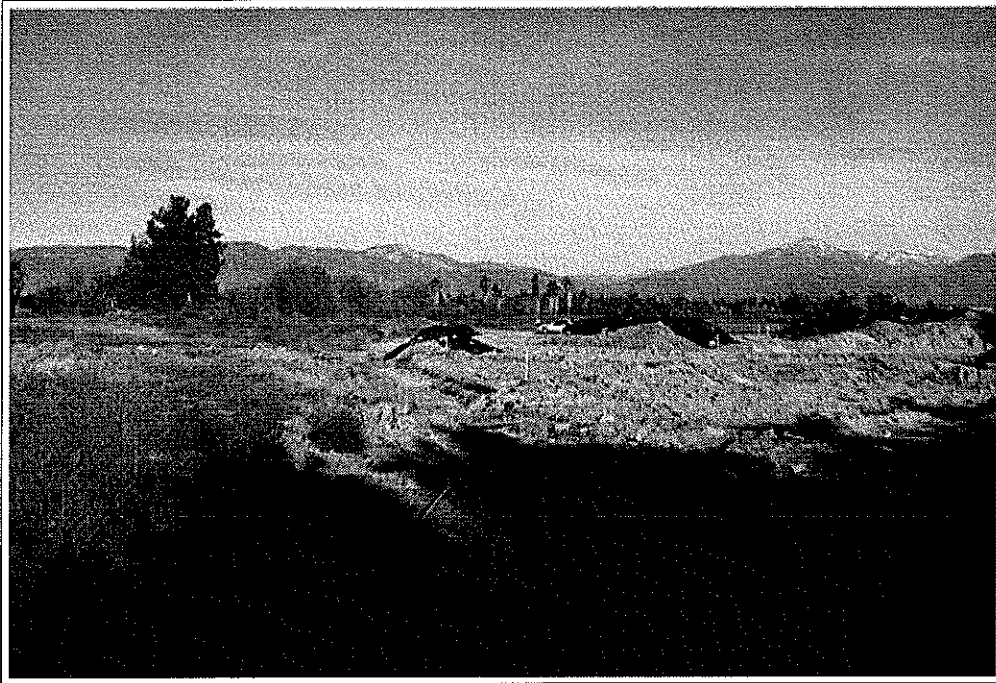
Photograph 1-6. Waste Soil



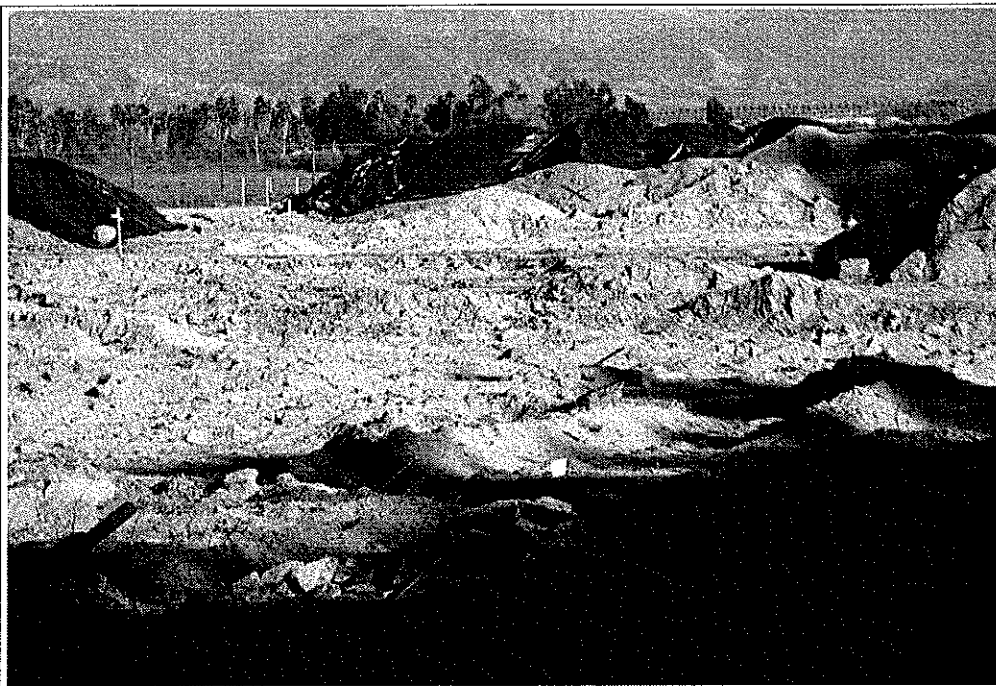
Photograph 1-7. AOC 40: Area 1 Soil Removal



Photograph 1-8. AOC: Area 2 Soil Removal



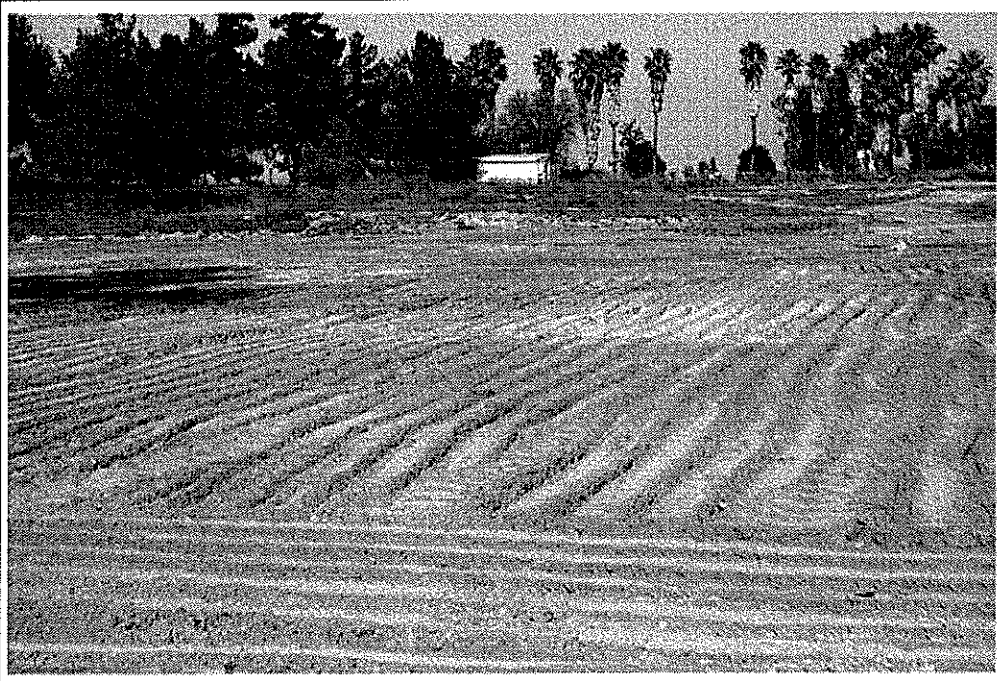
Photograph 1-9. AOC 40: North Drainage Canal



Photograph 1-10. AOC 40: Area 1 Sampling Location Flags



Photograph 1-11. AOC 40: Area 4 Waste Soil



Photograph 1-12. AOC 40: Post-Removal Restoration

APPENDIX B

LABORATORY ANALYTICAL DATA

[illegible]

FINAL DATA - AOC 40

(Page 2 of 21)

Analyte	Method	Unit	NORTN			NORTN			NORTN			NORTN			NORTN			NORTN												
			Result	QA	IRL DFI	Result	QA	IRL DFI	Result	QA	IRL DFI	Result	QA	IRL DFI	Result	QA	IRL DFI	Result	QA	IRL DFI										
moisture, percent	E160.3-MOD	%	1.2		[0.10, 1]	5.8		[0.10, 1]	2.8		[0.10, 1]	5.2		[0.10, 1]	1.3		[0.10, 1]	4.5		[0.10, 1]	4.7		[0.10, 1]	0.50		[0.10, 1]	4.1		[0.10, 1]	
			Result	QA	IRL DFI	Result	QA	IRL DFI	Result	QA	IRL DFI	Result	QA	IRL DFI	Result	QA	IRL DFI	Result	QA	IRL DFI	Result	QA	IRL DFI	Result	QA	IRL DFI	Result	QA	IRL DFI	
			NA	A40-A1-CS-07	NA	A40-A1-CS-08	NA	A40-A1-CS-08	NA	A40-A1-CS-08	NA	A40-A1-CS-09	NA	A40-A1-CS-09	NA	A40-A1-CS-09	NA	A40-A1-CS-10	NA	A40-A1-CS-10	NA	A40-A1-CS-10	NA	A40-A1-CS-10	NA	A40-A1-CS-11	NA	A40-A1-CS-11		
Point			1/9/2004 09:30		1/9/2004 09:30	1/9/2004 09:35		1/9/2004 07:40	3/5/2004 07:40	3/5/2004 07:40	1/9/2004 09:40	1/9/2004 09:40	1/9/2004 07:30	3/5/2004 07:30	1/9/2004 09:43	1/9/2004 09:43	6/24/2004 11:30	6/24/2004 11:30	1/9/2004 08:45	1/9/2004 08:45										
Sampling Date			-		-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sample Depth																														
Sample Type			N1		N1	N1		FR1		FR1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	
Field Sample			A40-A1-CS-007-D0.0		A40-A1-CS-008-D0.0	A40-A1-CS-008-D0.0		A40-A1-CS-208-D0.0		A40-A1-CS-009-D0.0	A40-A1-CS-009-D0.0	A40-A1-CS-009-D0.0	A40-A1-CS-209-D0.0	A40-A1-CS-010-D0.0	A40-A1-CS-010-D0.0	A40-A1-CS-210-D0.0	A40-A1-CS-011-D0.0	A40-A1-CS-011-D0.0	A40-A1-CS-011-D0.0	A40-A1-CS-011-D0.0	A40-A1-CS-011-D0.0	A40-A1-CS-011-D0.0	A40-A1-CS-011-D0.0	A40-A1-CS-011-D0.0	A40-A1-CS-011-D0.0	A40-A1-CS-011-D0.0	A40-A1-CS-011-D0.0	A40-A1-CS-011-D0.0	A40-A1-CS-011-D0.0	
Lab Sample			E4A130167-007		E4A130167-008	E4A130167-008		E4C060186-003		E4C060186-009	E4C060186-009	E4C060186-009	E4C060186-004	E4A130167-010	E4A130167-010	E4F250279-001	E4A130167-011	E4A130167-011	E4A130167-011	E4A130167-011	E4A130167-011	E4A130167-011	E4A130167-011	E4A130167-011	E4A130167-011	E4A130167-011	E4A130167-011	E4A130167-011	E4A130167-011	
PVC / Run			PR / 1		PR / 1	PR / 1		PR / 1		PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	
Status			Validated		Validated	Validated		Validated		Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated

FINAL DATA - AOC 40 (Page 3 of 21)

Base	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN
Site	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Point	A40-A1-CS-12	A40-A1-CS-12	A40-A1-CS-13	A40-A1-CS-13	A40-A1-CS-13	A40-A1-CS-14	A40-A1-CS-14	A40-A1-CS-14	A40-A1-CS-15	A40-A1-CS-15	A40-A1-CS-15
Sampling Date	1/9/2004 09:50	3/5/2004 08:00	1/9/2004 09:55	1/9/2004 09:55	1/9/2004 09:55	1/9/2004 08:00	1/9/2004 10:01	3/5/2004 08:40	1/9/2004 10:05	3/5/2004 08:44	3/5/2004 08:44
Sample Depth	-	-	-	-	-	-	-	-	-	-	-
Sample Type	N1	N1	FR 1	FR 1	FR 1	N1	N1	N1	N1	N1	N1
Field Sample	A40-A1-CS-012-D0.0	A40-A1-CS-212-D0.0	A40-A1-CS-013-D0.0	A40-A1-CS-013-D0.0	A40-A1-CS-113-D0.0	A40-A1-CS-213-D0.0	A40-A1-CS-014-D0.0	A40-A1-CS-214-D0.0	A40-A1-CS-015-D0.0	A40-A1-CS-215-D0.0	A40-A1-CS-215-D0.0
Lab Sample	E4A130167-012	E4C060186-005	E4A130167-013	E4A130167-013	E4A130167-017	E4C060186-006	E4A130167-014	E4C060186-007	E4A130167-015	E4C060186-008	E4C060186-008
PVC / Run	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1
Status	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated
Method	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit
moisture, percent	E160.3-MOD %	E160.3-MOD %	E160.3-MOD %	E160.3-MOD %	E160.3-MOD %	E160.3-MOD %	E160.3-MOD %	E160.3-MOD %	E160.3-MOD %	E160.3-MOD %	E160.3-MOD %
Result	7.0	1.6	6.5	6.7	7.2	3.4	4.6	4.8	7.0	7.0	7.0
QA	[0.10, 1]	[0.10, 1]	[0.10, 1]	[0.10, 1]	[0.10, 1]	[0.10, 1]	[0.10, 1]	[0.10, 1]	[0.10, 1]	[0.10, 1]	[0.10, 1]
IRL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DFI	1	1	1	1	1	1	1	1	1	1	1

(Page 4 of 21)

Analyte	Method	Unit		NORTN			NORTN			NORTN			NORTN			NORTN			NORTN				
		Result	QA	IRL	DFl	Result	QA	IRL	DFl	Result	QA	IRL	DFl	Result	QA	IRL	DFl	Result	QA	IRL	DFl		
moisture, percent	E160.3-MOD %	6.3	[0.10, 1]	6.2	[0.10, 1]	5.4	[0.10, 1]	5.0	[0.10, 1]	3.9	[0.10, 1]	3.7	[0.10, 1]	3.3	[0.10, 1]	2.9	[0.10, 1]	2.9	[0.10, 1]	2.9	[0.10, 1]		
Base Site				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Point				A40-A2-CS-01	A40-A2-CS-02	A40-A2-CS-03	A40-A2-CS-04	A40-A2-CS-05	A40-A2-CS-06	A40-A2-CS-07	A40-A2-CS-08	A40-A2-CS-08	A40-A2-CS-08	A40-A2-CS-08	A40-A2-CS-08	A40-A2-CS-08	A40-A2-CS-08	A40-A2-CS-08	A40-A2-CS-08	A40-A2-CS-08			
Sampling Date				1/9/2004 10:25	1/9/2004 10:30	1/9/2004 10:34	1/9/2004 12:45	1/9/2004 12:50	1/9/2004 12:55	1/9/2004 13:00	1/9/2004 13:03	1/9/2004 13:03	1/9/2004 13:03	1/9/2004 13:03	1/9/2004 13:03	1/9/2004 13:03	1/9/2004 13:03	1/9/2004 13:03	1/9/2004 13:03	1/9/2004 13:03			
Sample Depth				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Sample Type				N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1			
Field Sample				A40-A2-CS-001-D0.0	A40-A2-CS-002-D0.0	A40-A2-CS-003-D0.0	A40-A2-CS-004-D0.0	A40-A2-CS-005-D0.0	A40-A2-CS-006-D0.0	A40-A2-CS-007-D0.0	A40-A2-CS-008-D0.0	A40-A2-CS-008-D0.0	A40-A2-CS-008-D0.0	A40-A2-CS-008-D0.0	A40-A2-CS-008-D0.0	A40-A2-CS-008-D0.0	A40-A2-CS-008-D0.0	A40-A2-CS-008-D0.0	A40-A2-CS-008-D0.0	A40-A2-CS-008-D0.0			
Lab Sample				E4A130167-018	E4A130167-019	E4A130167-020	E4A130167-021	E4A130167-022	E4A130167-023	E4A130167-024	E4A130167-025	E4A130167-025	E4A130167-025	E4A130167-025	E4A130167-025	E4A130167-025	E4A130167-025	E4A130167-025	E4A130167-025	E4A130167-025			
PVC / Run				PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1			
Status				Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated			
Method				Result	QA	IRL	DFl	Result	QA	IRL	DFl	Result	QA	IRL	DFl	Result	QA	IRL	DFl	Result	QA	IRL	DFl

(Page 5 of 21)

Analyte	Method	Unit
moisture, percent	E160.3-MOD	%

Base Site	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN				
Point	A40-A3-CS-07	A40-A3-CS-08	A40-A3-CS-09	A40-A4-CS-01	A40-A4-CS-02	A40-A4-CS-03	A40-A4-CS-04	NA	NA	NA				
Sampling Date	1/9/2004 13:30	1/9/2004 13:35	1/9/2004 13:40	1/9/2004 13:45	1/9/2004 13:50	1/9/2004 13:52	1/9/2004 13:54	1/9/2004 13:56	1/9/2004 13:56	1/9/2004 13:56				
Sample Depth	-	-	-	-	-	-	-	-	-	-				
Sample Type	FR1	N1	N1	N1	N1	N1	N1	N1	N1	FR1				
Field Sample	A40-A3-CS-107-D0.0	A40-A3-CS-008-D0.0	A40-A3-CS-009-D0.0	A40-A4-CS-001-D0.0	A40-A4-CS-002-D0.0	A40-A4-CS-003-D0.0	A40-A4-CS-004-D0.0	A40-A4-CS-005-D0.0	A40-A4-CS-105-D0.0					
Lab Sample	E4A130167-037	E4A130167-035	E4A130167-036	E4A130167-038	E4A130167-039	E4A130167-040	E4A130167-041	E4A130167-042	E4A130167-044					
PVC / Run	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1					
Status	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated				
Method	Result	QA	IRL	DFL	Result	QA	IRL	DFI	Result	QA	IRL	DFI		
moisture, percent	5.4	[0.10, 1]	3.6	[0.10, 1]	3.3	[0.10, 1]	4.0	[0.10, 1]	4.0	[0.10, 1]	4.7	[0.10, 1]	2.9	[0.10, 1]

FINAL DATA - AOC 40

(Page 7 of 21)

Analyte	Method	Unit	NORTN		NORTN		NORTN		NORTN		NORTN		NORTN		NORTN		NORTN			
			Result	QA	Result	QA	Result	QA	Result	QA	Result	QA	Result	QA	Result	QA	Result	QA		
moisture, percent	E160.3-MOD %	%	6.8	[0.10, 1]	2.0	[0.10, 1]	7.1	[0.10, 1]	5.1	[0.10, 1]	4.5	[0.10, 1]	5.0	[0.10, 1]	0.60	[0.10, 1]	2.1	[0.10, 1]	4.2	[0.10, 1]

[illegible]

FINAL DATA - AOC 40

(Page 9 of 21)

Base		NORTN	
Site		NA	
Point		A40-A4-CS-21	
Sampling Date		1/12/2004 10:00	
Sample Depth		-	
Sample Type		N1	
Field Sample		A40-A4-CS-021-D0.0	
Lab Sample		E4A130177-015	
PVC / Run		PR / 1	
Status		Validated	
Analyte	Method	Unit	
moisture, percent	E160.3-MOD	%	
			Result QA IRL DFI
			10.2 [0.10, 1]

[illegible]

(Page 11 of 21)

Analyte	Method	Unit
arsenic	SW6010B	mg/kg
cadmium	SW6010B	mg/kg

(Page 12 of 21)

Analyte	Method	Unit
arsenic	SW6010B	mg/kg
cadmium	SW6010B	mg/kg

[illegible]

[illegible]

Base Site	NORTN		NORTN		NORTN		NORTN		NORTN		NORTN		NORTN					
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA					
Point	A40-A4-CS-01	A40-A4-CS-02	A40-A4-CS-03	A40-A4-CS-04	A40-A4-CS-05	A40-A4-CS-06	A40-A4-CS-07	A40-A4-CS-08	A40-A4-CS-09	A40-A4-CS-10	A40-A4-CS-11	A40-A4-CS-12	A40-A4-CS-13					
Sampling Date	1/9/2004 13:45	1/9/2004 13:50	1/9/2004 13:52	1/9/2004 13:54	1/9/2004 13:56	1/9/2004 13:58	1/9/2004 14:00	1/9/2004 14:02	1/9/2004 14:04	1/9/2004 14:06	1/9/2004 14:08	1/9/2004 14:10	1/9/2004 14:12					
Sample Depth	-	-	-	-	-	-	-	-	-	-	-	-	-					
Sample Type	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1					
Field Sample	A40-A4-CS-001-D0.0	A40-A4-CS-002-D0.0	A40-A4-CS-003-D0.0	A40-A4-CS-004-D0.0	A40-A4-CS-005-D0.0	A40-A4-CS-006-D0.0	A40-A4-CS-007-D0.0	A40-A4-CS-008-D0.0	A40-A4-CS-009-D0.0	A40-A4-CS-010-D0.0	A40-A4-CS-011-D0.0	A40-A4-CS-012-D0.0	A40-A4-CS-013-D0.0					
Lab Sample	E4A130167-038	E4A130167-039	E4A130167-040	E4A130167-041	E4A130167-042	E4A130167-043	E4A130167-044	E4A130167-045	E4A130167-046	E4A130167-047	E4A130167-048	E4A130167-049	E4A130167-050					
PVC / Run	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1					
Status	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated					
Analyte	Method	Unit	Result	QA	IRL	DFI	Result	QA	IRL	DFI	Result	QA	IRL	DFI	Result	QA	IRL	DFI
arsenic	SW6010B	mg/kg	1.9	[1.0, 1]	1.5	[1.0, 1]	1.4	[1.1, 1]	1.7	[1.0, 1]	1.2	[1.0, 1]	1.4	[1.0, 1]	2.3	[1.1, 1]	1.6	[1.1, 1]
cadmium	SW6010B	mg/kg	1.2	[0.52, 1]	3.0	[0.52, 1]	ND	[0.53, 1]	0.69	[0.52, 1]	ND	[0.52, 1]	0.68	[0.51, 1]	4.3	[0.54, 1]	1.3	[0.54, 1]

FINAL DATA - AOC 40 (Page 16 of 21)

Y-330-03-01-17														
Base	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN
Site	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Point	A40-A4-CS-09	A40-A4-CS-10	A40-A4-CS-11	A40-A4-CS-12	A40-A4-CS-12	A40-A4-CS-12	A40-A4-CS-13	A40-A4-CS-14	A40-A4-CS-15	A40-A4-CS-16	A40-A4-CS-17	A40-A4-CS-17	A40-A4-CS-17	A40-A4-CS-17
Sampling Date	1/12/2004 09:18	1/12/2004 09:21	1/12/2004 09:26	1/12/2004 09:29	1/12/2004 09:29	1/12/2004 09:29	1/12/2004 09:33	1/12/2004 09:36	1/12/2004 09:41	1/12/2004 09:44	1/12/2004 09:45	1/12/2004 09:45	1/12/2004 09:45	1/12/2004 09:45
Sample Depth	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample Type	N1	N1	N1	FR1	FR1	FR1	N1	N1	N1	N1	N1	N1	N1	N1
Field Sample	A40-A4-CS-009-D0.0	A40-A4-CS-010-D0.0	A40-A4-CS-011-D0.0	A40-A4-CS-012-D0.0	A40-A4-CS-012-D0.0	A40-A4-CS-112-D0.0	A40-A4-CS-013-D0.0	A40-A4-CS-014-D0.0	A40-A4-CS-015-D0.0	A40-A4-CS-016-D0.0	A40-A4-CS-017-D0.0	A40-A4-CS-017-D0.0	A40-A4-CS-017-D0.0	A40-A4-CS-017-D0.0
Lab Sample	E4A130177-003	E4A130177-004	E4A130177-005	E4A130177-006	E4A130177-006	E4A130177-017	E4A130177-007	E4A130177-008	E4A130177-009	E4A130177-010	E4A130177-011	E4A130177-011	E4A130177-011	E4A130177-011
PVC / Run	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1	PR / 1
Status	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated
Analyte	Method	Unit	Result	QA	RL	DFI	Result	QA	RL	DFI	Result	QA	RL	DFI
arsenic	SW6010B	mg/kg	1.9	[1.1, 1]	1.8	[1.1, 1]	1.3	[1.0, 1]	1.2	[1.0, 1]	1.3	[1.0, 1]	1.1	[1.1, 1]
cadmium	SW6010B	mg/kg	3.9	[0.53, 1]	4.9	[0.53, 1]	0.53	[0.50, 1]	ND	[0.51, 1]	2.4	[0.52, 1]	3.4	[0.54, 1]

(Page 17 of 21)

Result	QA	[RL, DFI]	Result	QA	[RL, DFI]	Result	QA	[RL, DFI]	Result	QA	[RL, DFI]
1.6	[1.0, 1]	1.7	[1.1, 1]	2.4	[1.1, 1]	1.5	[1.1, 1]	ND	[1.0, 1]	1.5	[1.1, 1]
1.9	[0.52, 1]	6.8	[0.54, 1]	9.5	[0.55, 1]	1.7	[0.53, 1]	ND	[0.51, 1]	ND	[0.56, 1]

[illegible]

[illegible]

FINAL DATA - AOC 40
(Page 20 of 21)

Base	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN	NORTN				
Site	NA	NA	NA	NA	NA	NA	NA	NA	NA				
Point	A40-A1-CS-01	A40-A1-CS-02	A40-A1-CS-03	A40-A1-CS-04	A40-A1-CS-05	A40-A1-CS-06	A40-A1-CS-07	A40-A1-CS-08	A40-A1-CS-09				
Sampling Date	1/9/2004 09:05	1/9/2004 09:10	1/9/2004 09:15	1/9/2004 09:18	1/9/2004 09:21	1/9/2004 09:21	1/9/2004 09:21	1/9/2004 09:23	1/9/2004 09:26				
Sample Depth	NT	NT	NT	NT	NT	NT	NT	NT	NT				
Sample Type	A40-A1-CS-001-D0.0	A40-A1-CS-002-D0.0	A40-A1-CS-003-D0.0	A40-A1-CS-004-D0.0	A40-A1-CS-005-D0.0	A40-A1-CS-006-D0.0	A40-A1-CS-007-D0.0	A40-A1-CS-008-D0.0	A40-A1-CS-009-D0.0				
Field Sample	EA130167-001	EA130167-002	EA130167-003	EA130167-004	EA130167-005	EA130167-006	EA130167-007	EA130167-008	EA130167-009				
Lab Sample	PR 1.1	PR 1.1	PR 1.1	PR 1.1	PR 1.1	PR 1.1	PR 1.1	PR 1.1	PR 1.1				
PVC / Run	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated				
Status	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated				
Method	Unit	Result	Ca	Co	Fe	IL	OT	Result	Ca	Co	Fe	IL	OT
Analyte													

Base	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH	NORTH
Site	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Point	A40-A3-CS-01	A40-A3-CS-02	A40-A3-CS-03	A40-A3-CS-04	A40-A3-CS-05	A40-A3-CS-06	A40-A3-CS-07	A40-A3-CS-08	A40-A3-CS-09	A40-A3-CS-10	A40-A3-CS-11	A40-A3-CS-12	A40-A3-CS-13
Sampling Date	1/9/2004 13:10	1/9/2004 13:15	1/9/2004 13:15	1/9/2004 13:21	1/9/2004 13:25	1/9/2004 13:26	1/9/2004 13:30	1/9/2004 13:31	1/9/2004 13:32	1/9/2004 13:33	1/9/2004 13:34	1/9/2004 13:35	1/9/2004 13:36
Sample Depth	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Sample Type	A40-A3-CS-001-D0.0	A40-A3-CS-002-D0.0	A40-A3-CS-003-D0.0	A40-A3-CS-004-D0.0	A40-A3-CS-005-D0.0	A40-A3-CS-006-D0.0	A40-A3-CS-007-D0.0	A40-A3-CS-008-D0.0	A40-A3-CS-009-D0.0	A40-A3-CS-010-D0.0	A40-A3-CS-011-D0.0	A40-A3-CS-012-D0.0	A40-A3-CS-013-D0.0
Field Sample	EA130167-020	EA130167-021	EA130167-022	EA130167-023	EA130167-024	EA130167-025	EA130167-026	EA130167-027	EA130167-028	EA130167-029	EA130167-030	EA130167-031	EA130167-032
Lab Sample	PR 1.1	PR 1.1	PR 1.1	PR 1.1	PR 1.1	PR 1.1	PR 1.1	PR 1.1	PR 1.1	PR 1.1	PR 1.1	PR 1.1	PR 1.1
PVC / Run	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated
Status	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated
Method	SW0002	SW0002	SW0002	SW0002	SW0002	SW0002	SW0002	SW0002	SW0002	SW0002	SW0002	SW0002	SW0002
Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Analyte	Andor 1016	Andor 1202	Andor 1220	Andor 1242	Andor 1244	Andor 1254	Andor 1259	Andor 1016	Andor 1202	Andor 1220	Andor 1242	Andor 1244	Andor 1254

[illegible]

Bliss Site	Analysis	Method	Unit	NORTH		NORTH		NORTH	
				NA	FR1	NA	FR1	NA	FR1
Point Sampling Date				19/20/2014 13:30	19/20/2014 13:30	19/20/2014 13:35	19/20/2014 13:40		
Sample Type				Field Sample	Field Sample	Field Sample	Field Sample		
Sample Depth				0.05 m	0.05 m	0.05 m	0.05 m		
PVC Run				Validated	Validated	Validated	Validated		
Status				NA	FR1	NA	FR1	NA	FR1
				SW6592	SW6592	SW6592	SW6592		
				mg/kg	mg/kg	mg/kg	mg/kg		
				ND	ND	ND	ND		
				[0.035, 1]	[0.035, 1]	[0.034, 1]	[0.034, 1]		
				Acetate 1016	Acetate 1016	Acetate 1016	Acetate 1016		
				mg/kg	mg/kg	mg/kg	mg/kg		
				ND	ND	ND	ND		
				[0.035, 1]	[0.035, 1]	[0.034, 1]	[0.034, 1]		
				Acetate 1221	Acetate 1221	Acetate 1221	Acetate 1221		
				mg/kg	mg/kg	mg/kg	mg/kg		
				ND	ND	ND	ND		
				[0.035, 1]	[0.035, 1]	[0.034, 1]	[0.034, 1]		
				Acetate 1232	Acetate 1232	Acetate 1232	Acetate 1232		
				mg/kg	mg/kg	mg/kg	mg/kg		
				ND	ND	ND	ND		
				[0.035, 1]	[0.035, 1]	[0.034, 1]	[0.034, 1]		
				Acetate 1248	Acetate 1248	Acetate 1248	Acetate 1248		
				mg/kg	mg/kg	mg/kg	mg/kg		
				ND	ND	ND	ND		
				[0.035, 1]	[0.035, 1]	[0.034, 1]	[0.034, 1]		
				Acetate 1254	Acetate 1254	Acetate 1254	Acetate 1254		
				mg/kg	mg/kg	mg/kg	mg/kg		
				ND	ND	ND	ND		
				[0.035, 1]	[0.035, 1]	[0.034, 1]	[0.034, 1]		
				Acetate 1265	Acetate 1265	Acetate 1265	Acetate 1265		
				mg/kg	mg/kg	mg/kg	mg/kg		
				ND	ND	ND	ND		
				[0.035, 1]	[0.035, 1]	[0.034, 1]	[0.034, 1]		

APPENDIX C

HUMAN HEALTH RISK TABLES

Scenario Time/Frame: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil at AOC40

TABLE 1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
NORTON AFB, AOC40

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3) Residential Human-health based TCG	Potential ARAR/ TBC Value	Potential ARAR/ TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
7440-38-2	Arsenic	1.00		3.1		mg/kg	A40-A1-CS-04	42 / 53	0.4 - 0.45	3.1E+00	N/A	3.9E-01	N/A	N/A	YES	ASL
7440-50-8	Cadmium	0.53		8.15		mg/kg	A40-A4-CS-19	15 / 30	0.06 - 0.067	8.2E+00	N/A	9.0E-00	N/A	N/A	YES	TX
11096-82-5	Arochlor-1260	0.024	J	0.024	J	mg/kg	A40-A3-CS-02	1 / 18	0.02 - 0.035	2.4E-02	N/A	2.2E-01	N/A	N/A	YES	TX
11097-89-1	Arochlor-1254	0.047		0.45		mg/kg	A40-A1-CS-10	8 / 18	0.02 - 0.035	4.5E-01	N/A	2.2E-01	N/A	N/A	YES	ASL

(1) Minimum/maximum detected concentration.

(2) Background values derived from 95% upper confidence limit of mean.

(3) Screening levels derived from Preliminary Remediation Goals (PRGs) developed by the USEPA (2000).

(4) Selection Reason: Above Screening Level (ASL): Toxicity Information Available (TX) and above the human-health based screening level/100.

Definitions ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

J = Estimated Value

COPC = Chemical of Potential Concern

SQL = Sample Quantitation Limit

N/A = Not Applicable

C = Carcinogenic

N = Non-Carcinogenic

TABLE 2
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
FUTURE LAND USE
NORTON AFB, AOC40

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil at AOC40

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
METALS Arsenic Cadmium	mg/kg	1.3E+00	1.9E+00	3.1E+00		mg/kg	1.9E+00	UCL-T	UCL-T > UCL-N
	mg/kg	1.4E+00	1.4E+01	8.2E+00		mg/kg	8.2E+00	Max	Max < UCL-T
PCBs Arochlor-1260 Arochlor-1254	mg/kg	1.2E-02	1.4E-02	2.4E-02	J	mg/kg	1.4E-02	UCL-N	UCL-N > UCL-T
	mg/kg	6.0E-02	1.3E-01	4.5E-01		mg/kg	1.3E-01	UCL-T	UCL-T > UCL-N

J = Reported value is <Contract Required Detection Limit, but >Instrument Detection Limit.

Scenario Timeframe:	Future
Medium:	Soil
Exposure Medium:	Soil
Exposure Point:	Soil at AOC40
Receptor Population:	Industrial worker
Receptor Age:	Adult

TABLE 3
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NORTON AIR FORCE BASE
NORTON AFB, IRP AOC40

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard	Intake (Non-Cancer) Units	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic	1.9E+00	mg/kg	1.9E+00	mg/kg	M	9.3E-07	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	3.1E-03
	Cadmium	8.2E+00	mg/kg	8.2E+00	mg/kg	M	3.9E-06	mg/kg-day	5.0E-04	mg/kg-day	N/A	N/A	7.8E-03
	Arochlor-1260	1.4E-02	mg/kg	1.4E-02	mg/kg	M	6.5E-09	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	3.2E-04
	Arochlor-1254	1.3E-01	mg/kg	1.3E-01	mg/kg	M	6.0E-06	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	3.0E-03
	(Total)												1.4E-02
Dermal	Arsenic	1.9E+00	mg/kg	1.9E+00	mg/kg	M	2.6E-07	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	8.6E-04
	Cadmium	8.2E+00	mg/kg	8.2E+00	mg/kg	M	3.6E-08	mg/kg-day	5.0E-04	mg/kg-day	N/A	N/A	7.2E-05
	Arochlor-1260	1.4E-02	mg/kg	1.4E-02	mg/kg	M	8.4E-09	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	4.2E-04
	Arochlor-1254	1.3E-01	mg/kg	1.3E-01	mg/kg	M	7.8E-08	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	3.9E-03
	(Total)												5.2E-03
Inhalation	Arsenic	1.9E+00	mg/kg	1.5E-09	mg/m ³	M	1.9E-10	mg/kg-day	8.6E-06	mg/kg-day	N/A	N/A	2.2E-05
	Cadmium	8.2E+00	mg/kg	6.2E-09	mg/m ³	M	7.8E-10	mg/kg-day	5.7E-06	mg/kg-day	N/A	N/A	1.4E-04
	Arochlor-1260	1.4E-02	mg/kg	1.0E-11	mg/m ³	M	1.3E-12	mg/kg-day	3.4E-04	mg/kg-day	N/A	N/A	3.8E-09
	Arochlor-1254	1.3E-01	mg/kg	9.5E-11	mg/m ³	M	1.2E-11	mg/kg-day	3.4E-04	mg/kg-day	N/A	N/A	3.6E-08
	(Total)												1.6E-04
Total Hazard Index Across All Exposure Routes/Pathways													2.0E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic

EPC = Exposure Point Concentration

mg/kg = milligrams per kilogram

mg/kg-day = milligrams per kilogram per day

mg/m³ = milligrams per cubic meter

N/A = Not Available

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil at AOC40
Receptor Population: Industrial
Receptor Age: Adult

TABLE 4
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NORTON AFB, AOC40

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	METALS PCBs Arochlor-1260 Arochlor-1254 (Total)	1.9E+00	mg/kg	1.9E+00	mg/kg	M	3.3E-07	1.5E+00	(mg/kg-day) ⁻¹	5.0E-07
		8.2E+00	mg/kg	8.2E+00	mg/kg	M	1.4E-06	N/A	(mg/kg-day) ⁻¹	N/A
		1.4E-02	mg/kg	1.4E-02	mg/kg	M	2.3E-09	2.0E+00	(mg/kg-day) ⁻¹	4.6E-09
		1.3E-01	mg/kg	1.3E-01	mg/kg	M	2.1E-08	2.0E+00	(mg/kg-day) ⁻¹	4.3E-08
Dermal	METALS PCBs Arochlor-1260 Arochlor-1254 (Total)	1.9E+00	mg/kg	1.9E+00	mg/kg	M	2.7E-07	1.5E+00	(mg/kg-day) ⁻¹	4.0E-07
		8.2E+00	mg/kg	8.2E+00	mg/kg	M	3.8E-08	N/A	(mg/kg-day) ⁻¹	N/A
		1.4E-02	mg/kg	1.4E-02	mg/kg	M	3.0E-09	2.0E+00	(mg/kg-day) ⁻¹	6.0E-09
		1.3E-01	mg/kg	1.3E-01	mg/kg	M	2.8E-08	2.0E+00	(mg/kg-day) ⁻¹	5.6E-08
Inhalation	METALS PCBs Arochlor-1260 Arochlor-1254 (Total)	1.9E+00	mg/kg	1.5E-09	mg/m ³	M	6.7E-11	1.5E+01	(mg/kg-day) ⁻¹	1.0E-09
		8.2E+00	mg/kg	6.2E-09	mg/m ³	M	2.8E-10	1.5E+01	(mg/kg-day) ⁻¹	4.2E-09
		1.4E-02	mg/kg	1.0E-11	mg/m ³	M	4.6E-13	2.0E+00	(mg/kg-day) ⁻¹	9.3E-13
		1.3E-01	mg/kg	9.5E-11	mg/m ³	M	4.3E-12	2.0E+00	(mg/kg-day) ⁻¹	8.6E-12
Total Risk Across All Exposure Routes/Pathways										1.0E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

EPC = Exposure Point Concentration

mg/kg = milligrams per kilogram

mg/kg-day = milligrams per kilogram per day

mg/m³ = milligrams per cubic meter

N/A = Not Available

TABLE 5
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
COMMERCIAL/INDUSTRIAL REUSE SCENARIO
REASONABLE MAXIMUM EXPOSURE
NORTON AFB, AOC40

Scenario Timelines: Future Receptor Population: Industrial worker Receptor Age: Adult														
Medium	Exposure Medium	Exposure Point	Chemical		Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
					Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Soil at AOC40	METALS Arsenic Cadmium PCBs Arochlor-1260 Arochlor-1254	5.0E-07 N/A 4.6E-09 4.3E-08	1.0E-09 4.2E-09 9.3E-13 8.6E-12	4.0E-07 N/A 6.0E-09 5.6E-08	9.0E-07 4.2E-09 1.1E-08 9.8E-08	METALS Arsenic Cadmium PCBs Arochlor-1260 Arochlor-1254	skin, hyperpigmentation and keratosis proteinuria (kidney) eye, immune system eye, immune system	3.1E-03 7.8E-03 3.2E-04 3.0E-03	2.2E-05 1.4E-04 3.8E-09 3.8E-08	8.6E-04 7.2E-05 4.2E-04 3.9E-03	4.0E-03 8.0E-03 7.4E-04 6.9E-03	
Total Risk Across All Media and All Exposure Routes									Total Hazard Index Across All Media and All Exposure Routes					
1.0E-06									2.0E-02					
1.0E-06									Total Skin HI = 4.0E-03					
									Total Kidney HI = 8.0E-03					
									Total Eyes, Immune System HI = 7.8E-03					

Scenario Timeframe:	Future
Medium:	Soil
Exposure Medium:	Soil
Exposure Point:	Soil at AOC40
Receptor Population:	Resident
Receptor Age:	Child and Adult

TABLE 6
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NORTON AFB, AOC40

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard	Child Intake (Non-Cancer)	Adult Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient (Child)	Hazard Quotient (Adult)
Ingestion	Arsenic	1.9E+00	mg/kg	1.9E+00	mg/kg	M	4.8E-05	1.3E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.6E-01	4.3E-03
		8.2E+00	mg/kg	8.2E+00	mg/kg	M	2.0E-04	5.4E-06	mg/kg-day	5.0E-04	mg/kg-day	N/A	N/A	4.0E-01	1.1E-02
	Arochlor-1260 Arochlor-1254	1.4E-02	mg/kg	1.4E-02	mg/kg	M	3.4E-07	9.0E-09	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	1.7E-02	4.5E-04
		1.3E-01	mg/kg	1.3E-01	mg/kg	M	3.1E-06	8.4E-08	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	1.6E-01	4.2E-03
(Total)															
Dermal	Arsenic	1.9E+00	mg/kg	1.9E+00	mg/kg	M	3.1E-06	3.6E-07	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.0E-02	1.2E-03
		8.2E+00	mg/kg	8.2E+00	mg/kg	M	4.4E-07	5.1E-08	mg/kg-day	5.0E-04	mg/kg-day	N/A	N/A	8.8E-04	1.0E-04
	Arochlor-1260 Arochlor-1254	1.4E-02	mg/kg	1.4E-02	mg/kg	M	1.0E-07	1.2E-08	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	5.1E-03	5.9E-04
		1.3E-01	mg/kg	1.3E-01	mg/kg	M	9.5E-07	1.1E-07	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	4.7E-02	5.5E-03
(Total)															
Inhalation	Arsenic	1.9E+00	mg/kg	1.5E-09	mg/m³	M	8.0E-10	2.6E-10	mg/kg-day	8.6E-06	mg/kg-day	N/A	N/A	9.3E-05	3.0E-05
		8.2E+00	mg/kg	6.2E-09	mg/m³	M	3.3E-09	1.1E-09	mg/kg-day	5.7E-06	mg/kg-day	N/A	N/A	5.8E-04	1.9E-04
	Arochlor-1260 Arochlor-1254	1.4E-02	mg/kg	1.0E-11	mg/m³	M	5.6E-12	1.8E-12	mg/kg-day	3.4E-04	mg/kg-day	N/A	N/A	1.6E-08	5.4E-09
		1.3E-01	mg/kg	9.5E-11	mg/m³	M	5.1E-11	1.7E-11	mg/kg-day	3.4E-04	mg/kg-day	N/A	N/A	1.5E-07	5.0E-08
(Total)															
Total Hazard Index Across All Exposure Routes/Pathways														8.0E-01	2.7E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic

EPC = Exposure Point Concentration

mg/kg = milligrams per kilogram

N/A = Not Available

mg/kg-day = milligrams per kilogram per day

mg/m³ = milligrams per cubic meter

TABLE 7
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NORTON AFB, AOC40

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil at AOC40
Receptor Population: Resident
Receptor Age: Child and Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk (1)	Child Intake (Cancer)	Adult Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk (Child)	Cancer Risk (Adult)	
Ingestion	METALS PCBs Arochlor-1260 Arochlor-1254 (Total)	1.9E+00	mg/kg	2.6E+00	mg/kg	M	5.5E-06	6.0E-07	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	8.3E-06	8.9E-07	
		8.2E+00	mg/kg	8.2E+00	mg/kg	M	1.7E-05	1.9E-06	mg/kg-day	N/A	(mg/kg-day) ⁻¹	N/A	N/A	
		1.4E-02	mg/kg	1.4E-02	mg/kg	M	2.9E-08	3.1E-09	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	5.7E-08	6.2E-09	
		1.3E-01	mg/kg	1.3E-01	mg/kg	M	2.7E-07	2.9E-08	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	5.3E-07	5.8E-08	
Dermal	PCBs Arochlor-1260 Arochlor-1254 (Total)	1.9E+00	mg/kg	1.9E+00	mg/kg	M	2.7E-07	1.2E-07	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	4.0E-07	1.9E-07	
		8.2E+00	mg/kg	8.2E+00	mg/kg	M	3.8E-08	1.7E-08	mg/kg-day	N/A	(mg/kg-day) ⁻¹	N/A	N/A	
		1.4E-02	mg/kg	1.4E-02	mg/kg	M	8.7E-09	4.0E-09	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	1.7E-08	8.1E-09	
		1.3E-01	mg/kg	1.3E-01	mg/kg	M	8.1E-08	3.7E-08	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	1.6E-07	7.5E-08	
Inhalation	PCBs Arochlor-1260 Arochlor-1254 (Total)	1.9E+00	mg/kg	1.5E-09	mg/m ²	M	6.8E-11	8.0E-11	mg/kg-day	1.5E+01	(mg/kg-day) ⁻¹	1.0E-09	1.3E-09	
		8.2E+00	mg/kg	6.2E-09	mg/m ²	M	2.9E-10	3.8E-10	mg/kg-day	1.5E+01	(mg/kg-day) ⁻¹	4.3E-09	5.6E-09	
		1.4E-02	mg/kg	1.0E-11	mg/m ²	M	4.7E-13	6.2E-13	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	9.5E-13	1.2E-12	
		1.3E-01	mg/kg	9.5E-11	mg/m ²	M	4.4E-12	5.8E-12	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	8.8E-12	1.2E-11	
Total Risk Across All Exposure Routes/Pathways													5.3E-09	7.0E-09
Total Risk Across All Exposure Routes/Pathways													9.5E-06	1.2E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.
EPC = Exposure Point Concentration
mg/kg = milligrams per kilogram
mg/kg-day = milligrams per kilogram per day
mg/m³ = milligrams per cubic meter
N/A = Not Available

TABLE 8
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPOs
RESIDENTIAL SCENARIO
REASONABLE MAXIMUM EXPOSURE
NORTON AFB, AOC40

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child and Adult

Medium	Exposure Medium	Exposure Point	Chemical	CHILD Carcinogenic Risk				Chemical	CHILD Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Soil at AOC40	METALS Arsenic Cadmium PCBs Arochlor-1260 Arochlor-1254	8.3E-06	1.0E-09	4.0E-07	8.7E-06	METALS Arsenic Cadmium PCBs Arochlor-1260 Arochlor-1261	skin, hyperpigmentation and keratosis proteinuria (kidney) eye, immune system eye, immune system	1.6E-01	9.3E-05	1.0E-02	1.7E-01
				N/A	4.3E-09	N/A	4.3E-09			4.0E-01	5.8E-04	8.8E-04	4.0E-01
				5.7E-08	9.5E-13	1.7E-08	7.5E-08			1.7E-02	1.6E-08	5.1E-03	2.2E-02
				5.9E-07	8.9E-12	1.6E-07	7.0E-07			1.6E-01	1.5E-07	4.7E-02	2.0E-01
				Total Risk Across Soil				Total Hazard Index Across All Media and All Exposure Routes					
				9.5E-06									
				9.5E-06									
								Total Skin HI =					
								1.7E-01					
								Total Kidney HI =					
								4.0E-01					
								Total Eyes, Nails, Immune System HI =					
								2.2E-01					

Medium	Exposure Medium	Exposure Point	Chemical	ADULT Carcinogenic Risk				Chemical	ADULT Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Soil at AOC40	METALS Arsenic Cadmium PCBs Arochlor-1260 Arochlor-1254	8.9E-07	1.3E-09	1.9E-07	1.1E-06	METALS Arsenic Cadmium PCBs Arochlor-1260 Arochlor-1261	skin, hyperpigmentation and keratosis proteinuria (kidney) eye, immune system eye, immune system	4.3E-03	3.0E-05	1.2E-03	5.8E-03
				N/A	5.6E-09	N/A	5.6E-09			1.1E-02	1.9E-04	1.0E-04	1.1E-02
				6.2E-09	1.2E-12	8.1E-09	1.4E-08			4.5E-04	5.4E-09	5.9E-04	1.0E-03
				5.8E-08	1.2E-11	7.5E-08	1.3E-07			4.2E-03	5.0E-08	5.5E-03	9.8E-03
				Total Risk Across Soil				Total Hazard Index Across All Media and All Exposure Routes					
				1.2E-06				2.7E-02					
				1.2E-06									
								Total Skin HI =					
								5.8E-03					
								Total Kidney HI =					
								1.1E-02					
								Total Eyes, Immune System HI =					
								1.1E-02					

